Subject programme

1. Subject name / subject module: **Computer Methods for Formulating Scientific Data**
2. Lecture language: **English**
3. The location of the subject in study plans:
   - Area or areas of the studies: **Computer Control Systems Engineering**
   - Degree of the studies: **2nd degree studies**
   - Field or fields (implementation of effects standard): **Mechatronics**
4. Supervision of subject implementation:
   - The Institute / Another unit: **The Institute of Informatics and Mechatronics**
   - The person responsible for the subject: **Pólkowski Zdzisław, dr inż.**
   - 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

Teaching activities with the tutor																							Total
Form of classes / Mode of study		SOW	ECTS	Laboratory work	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	ECTS
Full-time studies				14	11	1																**1**
Part-time studies																						
Credit rigor	...			pass/fail grading																		

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 laboratory classes	**14**
Preparing tasks and reports	**9**
Participation in an exam / graded assignment / final grading	**2**
Total student workload	**25**
ECTS credits	**1**
* Student's workload related to practical forms	**25**
Student's workload in classes requiring direct participation of academic teachers	**14**

7. Implementation notes: recommended duration (semesters), recommended admission requirements, relations between the forms of classes:

   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_W01	**Student deeply knows and understands selected facts and phenomena, explaining the complex relationships between them, which constitute advanced general knowledge of mathematics and physics, sufficient to formulate and solve complex tasks related to mechatronics using computer tools.**	**Laboratory work**	**Inquiry methods**	**Student learning activites**
K_W07	**Student has a structured and theoretically founded knowledge in the field of technical informatics, including key issues and selected issues in the field of advanced detailed knowledge, as well as the practical application of this knowledge in mechatronics through the use of appropriate methods and tools.**			

Skills				
K_U01	Student is able to obtain information (in Polish and English) from literature, databases and other sources, integrate them, make their interpretation, critical analysis, synthesis and presentation of this information, formulate and solve complex and unusual problems and perform tasks in an innovative way. Student knows the most important scientific online databases.	Laboratory work	Inquiry methods	Student learning activites
K_U02	Student is able to use information and communication technologies (ICT) with particular emphasis on the development of project documentation and the use of engineering graphics for the implementation of projects and tasks in the field of mechatronics. Student is able to use statistic tools.			
K_U03	Student is able to plan and carry out experiments, including measurements and computer simulations using and adapting existing or developing new methods and tools, interpret the obtained results and draw conclusions using computer solutions.			

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

0% - 50%	ndst	**81% - 90%**	db
51% - 70%	dst	**91% - 93%**	db+
71% - 80%	dst+	**94% - 100%**	bdb

Activity	Grades	Calculation	To Final
Exercise reports	**bdb (5)**	**2*50%**	**2,5**
Activity during classes	**dst, db, bdb (3,4,5)**	**average (3+4+5)/3=4->4*20%**	**0,8**
Completed tasks	**ndst, dst, db (2, 3, 4)**	**average (2+3+4)/3=3->3*20%**	**0,6**
Attendance	**75% classes**	**attendance share 6/8=0,75*5->3,75***	**0,375**

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

(Laboratory work)

Data formats and types : general; currency; accounting; dates; time; percentage; fractional; scientific; text; special; non-standard.

2. Graphs as data files : graphs for statistical data; functional relationship graphs; special charts: Surface, radar, stock-exchange, ring-shaped;

3. Statistical compilation of measurement data: Error of measurement and its types; uncertainty of measurement and evaluation; estimation of standard deviation estimator; standard deviation estimation; Gauss breakdown; extended uncertainty, confidence intervals; Q-Dixon test;

4.Statistical analysis of measurement series (populations): Correlation of results, correlation coefficient; conarianescence; mortgage testing: Chi2 test, F-Snedecora test, t-Studenta, Hampela test;

5.Aproximacy and smoothing of data : Data "smoothing" techniques; method of least squares; approximations of 2-6 degree diametrically; approximation of all functions.

11. Required teaching aids

Laboratory classes - specialist laboratory

12. Literature:

a. Basic literature:

Łukasiewicz Dariusz, Pouivet Roger (red.), Scientific knowledge and common knowledge,

Lind Douglas A., Marchal William G., Wathen Samuel A., Basic statistics for business and economics, 8th ed., 2013

a. Supplementary literature:

Levin Richard I., Rubin David S., Statistics for Management, Sygnatura: 37808

b. Internet sources:

https://www.wikihow.com/Find-Information-Online

https://www.mindtools.com/pages/article/internet-searching.htm

https://clarivate.com/webofsciencegroup/solutions/isi-institute-for-scientific-information/

https://publons.com/about/home/

https://orcid.org/

https://www.researcherid.com/#rid-for-researchers

https://www.scopus.com/search/form.uri?display=basic

https://www.researchgate.net/

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. Laboratory classes	Pólkowski Zdzisław, dr inż.