Subject programme

1. Subject name / subject module: **Mathematics**
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**
   - Field 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: **Gireń Bolesław, prof. dr hab. inz**
   - 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																					
Mode of study	Form of classes																				Total
	Lecture	SOW	ECTS	Classes	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	ECTS
Full-time studies	35	78	4,5	26	49	3																**7,5**
Part-time studies																						
Credit rigor		exam																				

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	**35/0**
Participation in laboratory classes	**26/0**
Independent study of the subject	**25/0**
Individual work on exercises	**72/0**
Preparation for an exam	**28/0**
Participation in an exam / graded assignment / final grading	**2/0**
Total student workload (TSW)	**188/0**
ECTS credits	**7,5**
* Student's workload related to practical forms	**98/0**
Student's workload in classes requiring direct participation of academic teachers	**61**

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 understands the role of mathematics as a tool for quantification the relationships and computing. Student knows all elementary functions and its properties. Student knows the fundamentals of matrix and linear algebra, especially applied to**	**Lecture, Classes**	**inquiry methods, expository methods**	**Assessment of activity during exercises, Assessment of the implementation of tasks representing individual topics.**
Skills				

K_U09	Student can solve algebraic equations graphically. Student can perform within the matrix field. Student can solve the systems of linear equations by Cramer or matrix methods. Student can transform and operate with vectors in coordinate	Classes	inquiry methods	Assessment of activity during exercises, Assessment of the implementation of tasks representing individual topics.

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
homeworks - 50 problems	**5*(number of solutions x)/50**	**0,5*5*(x/50)**	**0,05*x**
test - 10 problems	**y=sum of the grades for each solution**	**0,5*(y/10)**	**0,05*y**

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

Lecture

1. Functions;
2. Matrix and Linear Algebra;
3. Vectors and Tensors;
4. Limits and Derivatives;
5. Differentiation Rules;
6. Applications of Differentiation;
7. Numerical and Functional Infinite Series;
8. Differentiation of Multi-Variable Function;
9. Integrals ;
10. Techniques of Integration;
11. Applications of Integration;
12. Multiple Integrals;
13. Ordinary Differential Equations;
14. Introduction to Partial Differential Equations;
15. Complex Numbers;
16. Laplace Transformation and its Applications;
17. Fourier Transformation and its Applications;
18. Numerical Methods.

11. Required teaching aids

Lecture - multimedia projector

Classes - a room adapted for conducting classes in the form of classes / workshops, multimedia projector

12. Literature:

a. Basic literature:

- Filipowicz M., Mathematics theoretical background and exercises, Białystok : WSFiZ, 2005.

b. Supplementary literature:

- John Berry, Patrick Wainwright, Foundation Mathematics for Engineers, Springer, Macmillan Publishers Limited 1991
- Jonathan Nimmo, Wilson Stothers, Fundamentals of University Mathematics, 3th ed. Colin McGregor, 2010
- Audrey Terras, Abstract Algebra with Applications, Published online: 23 May 2019 Cambridge mathematical textbooks
- John B. Conway, A First Course in Analysis, 2017, Cambridge mathematical textbooks

c. Internet sources:

- SERGE LANG, BASIC MATHEMATICS; ADDISON -WESLEY PUBLISHING CO.; https://www.docdroid.net/K1VENuF/basic-mathematics-serge-lang.pdf
- JAMES STEWART, CALCULUS. EARLY TRANSCENDENTALS; https://theswissbay.ch/pdf/Gentoomen%20Library/Maths/Calculus/Calculus%20-%20J.%20Stewart.pdf
- STEPHEN BOYD, INTRODUCTION TO APPLIED LINEAR ALGEBRA; CAMBRIDGE UNIVERSITY PRESS; vmls-book.stanford.edu/vmls.pdf
- GILBERT STRANG, LINEAR ALGEBRA AND ITS APPLICATIONS; THOMPSON BROOKS/COLE; www.math.hcmus.edu.vn/~bxthang/Linear%20algebra%20and%20its%20applications.pdf

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	Gireń Bolesław, dr hab. inż.
2. Classes	Gireń Bolesław, dr hab. inż.