DESCRIPTION OF THE COURSES

- Course code: ELR1306
- Course title: NUMERICAL METHODS IN THE TECHNIQUE
- Language of the lecturer: Polish

Course form	Lecture	Classes	Laboratory	Project	Seminar
Number of hours/week*	1			1	
Number of hours/semester*	15			15	
Form of the course completion	test			problem tasks	
ECTS credits	1			1	
Total Student's Workload	30			30	

- Level of the course (basic/advanced): advanced
- Prerequisites: informatics fundamentals, numerical methods.
- Name, first name and degree of the lecturer/supervisor:

JAROSŁAW SZYMAŃDA, dr inż. doc. PWr

- Names, first names and degrees of the team's members:
    1. LESZEK WOŹNY , dr inż.

    2. JACEK REZMER,dr inż.

- Year:....I.......   Semester:.....1...........
- Type of the course (obligatory/optional): obligatory
- Aims of the course (effects of the course):
- Form of the teaching (traditional/e-learning): traditional.
- Course description:

The elements of the theory of mistakes - the transfer of the mistakes. Arithmetic it stood and the floating-point numbers about the finiteness binary representation. Advanced techniques of programming numeric in the languages of the programming of Delphi, Java and Matlab. Algorithms of solving the arrangements of non-linear equations. Marking the zer of polynomials the method Baristowa and Laguerre'a. Modelling the non-linear electric arrangements of the solid current. The methods of the type Rungego-Kutty. Chosen elements of programming of Fourier transformations.

- Lecture:

Particular lectures contents	Number of hours
1. The introduction. Advanced computational techniques. Examples of the programming of technical questions in languages Delphi, Java, Matlab.	2.0
2. Algorithms of solving the arrangements of non-linear equations.	2.0

Methods: bisection, Newton's and modified Newton's. Examples of modelling non-linear arrangements in the technique.	
3. The non gradient and the gradient methods of searches the minimum of the function one and many of variables	2.0
4. Marking the zer of polynomials the method Baristowa and Laguerre'a. Multiple elements. The analysis of algebraical equations marked as the conditioned bad solution.	2.0
5. The method of the finite elements.	2.0
6 Chosen elements of programming of Fouriera transformations . The algorithm Hornera. FFT- the example of the algorithm Cooleya-Tukeya	2.0
7.Genetic algorithms.The example of the realization of the ants algorithm	2.0
8. Test	1.0

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
- Project – the contents:

Students individually realising, under leader control, tasks amount to illustrations of the topic lecture and in the two-person group laboratory compile chosen problem. Each topic comprises consecutive realization stage: theoretical working-out, algorithmization and programming, start-up and acceptance testing with documenting. Students group choose one wide topic. Themes are changed in each academic year and not are repeated.

Problem tasks:

Solving electric arrangements with non-linear elements. Fouriera discreet transformation: marking the basic the frequency of periodical signals. Solving shore questions the method of finite elements. The optimization the method of the the largest fall. The example of utilization of the formic algorithm in the filtration of electric signals.

- Basic literature:
    1. Metody numeryczne, G.Dahlquist, A.Bjork, PWN 1983
    2. Przegląd metod i algorytmów numerycznych - cz.1 i 2, J.i M. Jankowscy, WNT 1981
    3. Wstęp do programowania systematycznego, N.Wirth, WNT 1978
- Additional literature:
    1. Algorytmy + struktury danych..., N. Wirth, WNT 1980
    2. Macierze w automatyce i elektrotechnice, T.Kaczorek, WNT 1984
    3. Równania różniczkowe cząstkowe, E.Kącki, WNT 1989
    4. Elektroniczna technika obliczeniowa, E.Kącki, PWN 1986
    5. Wstęp do metod numerycznych, J.Stoer, R.Bulrisch, PWN 1980
    6. Metody rozwiązywania równań siatkowych, A.Samarski, J.S. Nikołajew, PWN 1988
    7. Metody statystyczne i obliczeniowe analizy danych, S.Brandt, PWN 1975
    8. Handbook of mathematical functions, M. Abramowitz, I.Stegun, Washington 1964, (Wydanie rosyjskie dostępne w czytelni Biblioteki Głównej PWr)
- Conditions of the course acceptance/credition: Derivation affirmative grade of lecture test and laboratory tasks.

* - depending on a system of studies