KARTA PRZEDMIOTU

I. Dane podstawowe

Nazwa przedmiotu	Algorytmy analizy numerycznej
Nazwa przedmiotu w języku angielskim	Algorithms of numerical analysis
Kierunek studiów	Informatyka
Poziom studiów (I, II, jednolite magisterskie)	I-stopnia
Forma studiów (stacjonarne, niestacjonarne)	stacjonarne
Dyscyplina	Informatyka
Język wykładowy	angielski

Koordynator przedmiotu/osoba odpowiedzialna	

Forma zajęć *(katalog zamknięty ze słownika)*	Liczba godzin	semestr	Punkty ECTS
wykład	30	III	5
konwersatorium			
ćwiczenia			
laboratorium	30	III	
warsztaty			
seminarium			
proseminarium			
lektorat			
praktyki			
zajęcia terenowe			
pracownia dyplomowa			
translatorium			
wizyta studyjna			

Wymagania wstępne	Introduction to differential and integral calculus Linear algebra with analytic geometry Basic knowledge of programming methods

II. Cele kształcenia dla przedmiotu

C1.The main aim of the course is to familiarize students with the methods of numerical analysis with emphasis on algorithm construction, analysis and implementation. C1 - To familiarize with the methods of numerical analysis and the basics of optimization methods and their applications to solve computational problems
C2 - Acquiring the ability to save and implement numerical analysis algorithms
C3 - To acquaint students with methods of approximate calculations for solving tasks for which exact solutions are difficult to find or impossible to determine analytically

III. Efekty uczenia się dla przedmiotu wraz z odniesieniem do efektów kierunkowych

Symbol	Opis efektu przedmiotowego	Odniesienie do efektu kierunkowego
WIEDZA		
W_01	Students know basic concepts of numerical analysis and optimization methods.	K_W01, K_W03, K_W06
W_02	The student knows the selected numerical methods in the field of interpolation, approximation, solving systems of linear equations, numerical integration, solving nonlinear equations, linear programming	K_W03, K_W06.
W_03	Student - understands the importance of numerical analysis methods and optimization methods to solve practical problems	K_W03, K_W06.
UMIEJĘTNOŚCI		
U_01	Students are able to use basic concepts of numerical analysis and optimization methods	K_U04, K_U07, K_U20, K_U22
U_02	The student is able to use selected methods of numerical analysis and optimization methods	K_U35 K_U04, K_U07, K_U08, K_U11, K_U20, K_U22
U_03	Student is able to implement selected numerical analysis algorithms and optimization methods	
KOMPETENCJE SPOŁECZNE		
K_01	Students are aware of the level of their knowledge and skills, understand the need of further training and improving both professional and personal competence	K_K04
K_02	The student has a need for lifelong learning and the ability to motivate others to broaden their qualifications	K_K01

IV. Opis przedmiotu/ treści programowe

1. Horner's scheme. Polynomial interpolation. Lagrange interpolation formula. Newton interpolation formula. Neville's iterative formula. Hermit interpolation.
2. Methods of solving systems of linear equations. Gaussian elimination method. Matrix distribution methods based on Gaussian elimination. Choleski distribution method A = LL * positively determined matrices. Choleski method without square roots.
3. Householder orthogonalization method
4. Approximation. Least squares method. Chebyshev systems. Householder's method of numerical solving of the method of least squares.
5. Numerical integration. Interpolation quadratures. Newton-Cotes quadratures.
6. Methods of solving nonlinear equations and their systems. Bisection method. Secant method, regula falsi method. Newton's method. Newton's multidimensional method.
7. Linear programming. Simplex method. Integer programming.

V. Metody realizacji i weryfikacji efektów uczenia się

Symbol efektu	Metody dydaktyczne *(lista wyboru)*	Metody weryfikacji *(lista wyboru)*	Sposoby dokumentacji *(lista wyboru)*

WIEDZA			
W_01	Lecture	Exam, tests	Filled, evaluated tests and exams
W_02	Lecture	Exam, tests	Filled, evaluated tests and exams
W_03	Work under direction	Submitted spreadsheets, documentation	printouts
UMIEJĘTNOŚCI			
U_01	Problem solving, Work under direction	Submitted spreadsheets, documentation	printouts
U_02	Problem solving, Work under direction	Submitted spreadsheets, documentation	printouts
KOMPETENCJE SPOŁECZNE			
K_01	Work in pairs	Submitted spreadsheets, documentation	printouts
K_02	Work in pairs	Submitted spreadsheets, documentation	printouts

VI.   Assesment criteria

Lecture. Based on written exam
90 – 100% (5,0)
80 – 89% (4,5)
70 – 79% (4,0)
60 – 69% (3,5)
50 – 59% (3,0)
less than 51% (2,0)

Classes
80% of attendance required
Based on two tests and submitted work
90 – 100% (5,0)
80 – 89% (4,5)
70 – 79% (4,0)
60 – 69% (3,5)
50 – 59% (3,0)
less than 51% (2,0)

The student may be released from the written part of the exam on the basis of the result obtained in tests. Detailed exemption conditions are given to students with each edition of the subject.
Further details shall be given during the classes and lecture

VII.   Obciążenie pracą studenta

Forma aktywności studenta	Liczba godzin
Liczba godzin kontaktowych z nauczycielem	**90**
Liczba godzin indywidualnej pracy studenta	**50**

VIII.   Literatura

Literatura podstawowa
W. Cheney, D. Kincaid, Numerical Mathematics and Computing, 6th ed., Thomson Brooks/Cole, 2008
Literatura uzupełniająca
J. Stoer, R. Bulirsch, Introduction to Numerical Analysis, Springer-Verlag, 1980. G. Dahlquist, Å. Björck, Numerical Methods, Dover Publications, 2003.