(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: NUMERICAL METHODS	**2. Course code**
3. Validity of course description: 2016/2017	
4. Level of studies: MA, MSc programme	
5. Mode of studies: intramural studies	
6. Field of study: ELECTRONICS AND TELECOMMUNICATION	(FACULTY SYMBOL) RAU
7. Profile of studies: general	
8. Programme:	
9. Semester: 1	
10. Faculty teaching the course: Institute of Electronics, Rau3	
11. Course instructor: Ewa Straszecka PhD, DSc	
12. Course classification: common	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: foundations of numerical methods and computer programming at the level of S1 studies	
16. Course objectives: providing knowledge and developing skills in advanced numerical methods applied in engineering practice	

17. Description of learning outcomes:

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	A student is provided with knowledge of using numerical algorithms to solve engineering problems in electronics.	Discussion of chosen problems during the lecture	Classical and multi-medial lecture	K2_W01
2.	A student knows how to run standard numerical procedures in the form of toolboxes.	Evaluation of results of PC calculations during lab. exercises	Classical and multi-medial lecture	K2_W01
3.	A student can link numerical methods and artificial intelligence methods .	Evaluation of results of solution of problems during lab. exercises	Laboratory exercises	K2_U1
4.	A student is able to solve an engineering problem by means of PC and provided software.	Evaluation of results of PC calculations during lab. exercises	Laboratory exercises	K2_U2, K2_U3
5.	A student is able to prepare a documentation of a problem solution and to formulate conclusions	Evaluation of an exercise report	Laboratory exercises	K2_U3, K2_U6

18. Teaching modes and hours

Lecture / BA /MA Seminar / Class / Project / Laboratory

lecture - 15 h., laboratory - 15 h

19. Syllabus description:

Lecture

Operations and calculations on matrices, special types of matrices, spline interpolation, reducing errors of interpolation, clustering methods: classical and fuzzy, linear discriminant analysis and its use for classification, data modeling – statistics and features of data sets, data mining - drawing knowledge from data, family of alpha-stable distribution.

Laboratory – exercises

1) Matrix inversion, determinant and tridiagonal matrices
2) Spline interpolation

3) Clustering methods
4) Linear discriminant analysis - Fisher linear analysis
5) Data modeling
6) Householder's transformation and matrix deflation.
7) Alpha-stable distributions

20. Examination: no exam

21. Primary sources:

1. W. H. Press, S. A. Teukolsky, W. T. Vetterling, B. P. Flannery, Numerical Recipes in C: the Art. of Scientific Computing, Cambrideg Univ. Press, 2000
2. A. Ralston, P. Rabinowitz – The first course in numerical analysis, Dover Publications 2001
3. Duda, R. O.; Hart, P. E.; Stork, D. H., Pattern Classification, Wiley Interscience, 2000

22. Secondary sources:

1. Fundamental Numerical Methods and Data Analysis, George W. Collins, II , Harvard Educational Books, 2003
2. E. Straszecka & oth. – Laboratorium metod numerycznych, skrypt Politechniki Śląskiej nr 2197, (in Polish)

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	15/5
2	Classes	/
3	Laboratory	15/15
4	Project	/
5	BA/ MA Seminar	/
6	Other	5/5
	Total number of hours	35/25

24. Total hours:60

25. Number of ECTS credits: 2

26. Number of ECTS credits allocated for contact hours: 1

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects):1

26. Comments:

Approved:

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(date, Instructor's signature)

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(*date , the Director of the Faculty Unit signature)*