Załącznik Nr 5 do Zarz. Nr 33/11/12

(facu	(faculty stamp) COURSE DESCR		IPTION		Z1-PU7	WYDANIE N1	Strona	1 z 3
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: TELEINFORMATICS (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: Tomasz Pander PhD, DSc, 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 d	escription	Method of assessment		Teach	ning methods		Learning outcomes reference code
1.	A student is provided with knowledged algorithms to solve engineering pro modeling, discriminant analysis and	ge of using numerical blems concerning data l image processing.	Discussion of chosen problems during the lecture	Class	sical and mu	lti-medial lecture	ŀ	K2A_W01
2.	A student knows how to run standar procedures in the form of toolboxes engineering problems in the field of communication technologies	rd numerical for solving information and	Evaluation of results of PC calculations during lab. exercises	Class	sical and mu	Iti-medial lecture	٢	<2A_W04
3.	A student can link numerical methor intelligence methods .	ds and artificial	Evaluation of results of solution of problems during lab. exercises	Labo	ratory exerci	ises	ł	<2A_U15
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		ŀ	K2A_U21	
5.	A student is able to prepare a docur problem solution and to formulate c	mentation of a onclusions	Evaluation of an exercise report	Labo	ratory exerci	ises	٢	<2A_U03

# 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	1
3	Laboratory	15/15
4	Project	1
5	BA/ MA Seminar	1
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:

(date, Instructor's signature)