SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Electronics, Telecommunications and Information Technology
1.3	Department	Communications
1.4	Field of study	Electronics and Telecommunications Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Telecommunications Technologies and Systems
1.7	Form of education	Full time
1.8	Subject code	TST-E40.00

2. Data about the subject

2.1	Subject name	Decision and estimation in information processing
2.2	Subject area	Electronics and Telecommunications Engineering
2.3	Course responsible/lecturer	Professor Monica BORDA, PhD
2.4	Teachers in charge of applications	Professor Monica BORDA, PhD Assistant Mihaela Cislariu, PhD Assistant Ioana Ilea

2.5	Year of study	III	2.6	Semester	2	2.7	Assessment	Exam	2.8	Subject category	DID/DOB

3. Estimated total time

Year/Sem.	Subject name	No. of weeks	Course	Applications			Course	Applications			Indiv. study	TOTAL	Credits
			[hours/ week]				[hours/ semester]						
				S	L	P		S	L	P			
III/2	Decision and estimation in information processing	14	2	0	2		28	0	28		74	130	5

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications	2
3.4	Total hours in the curriculum	56	3.5	of which, course	28	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	56
Supplementary study in the library, online and in the field	8
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	4
Tutoring	2
Exams and tests	3
Other activities	1

3.7	Total hours of individual study	74
3.8	Total hours per semester	130
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	NA
4.2	Competence	NA

5. Requirements (where appropriate)

5.1	For the course	Cluj-Napoca
5.2	For the applications	Cluj-Napoca

6. Specific competences

Professional competences	C4. To design, implement and operate data, voice, video and multimedia services, based on the understanding and application of fundamental concepts from the field of communications and information transmission. C5. To select, install, configure and exploit fixed and mobile telecommunications equipment. To equip a site with common telecommunications networks. C6. To solve wide-band telecommunications networks' specific problems: propagation in various transmission media, high frequency circuits and equipment (microwaves and optical).
Cross competences	N.A.

7. Discipline objectives (as results from the key competences gained)

7.1	General objectives	Development of professional abilities in the domain of binary decision and signal and parameter estimation systems.
7.2	Specific objectives	1. Gain of theoretical knowledge concerning the design of decision and estimation systems. 2. Gain of theoretical knowledge concerning design of random processes, Markov processes and of the noise in digital communication systems. 3. Achievement of abilities and skills necessary for the implementation of software applications or hardware schemes using MATLAB and LABVIEW tools

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Random variables.	Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation	Use of blackboard
2	Random processes. Stationarity and ergodicity		
3	Noise sequences and pseudo-noise sequences.		
4	Markov processes.		
5	Noise: definition, classification, models.		
6	Noise in telecommunications systems.		
7	Theory of decision. Decisions criteria (Bayes, Kotelinkov-Zeigert, Fischer, Min-max, Neyman-Pearson)		
8	Binary decision with discrete observation.		
9	Binary decision with continuous observation		
10	Theory of parameter estimation		
11	Model of an ITS with parameter estimation. Discrete and continuous observation. Costs function.		

12	Minimum mean square error estimation. MAP estimation		
13	Continuous observation random signal estimation		
14	Review of the course concerning the exam.		
8.2. Applications (lab)		Teaching methods	Notes
1	Introduction. Random variables		
2	Experimental determination of the probability distribution function		
3	Pseudo-noise sequences	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, computers, blackboard
4	Markov processes		
5	Noise in telecommunications systems		
6	Binary decision system		
7	Parameter estimation system		

Bibliography

1. M. Borda, Fundamentals in Information Theory and Coding – Springer 2011, ISBN 978-3-642-20346-6, 509p
2. S. M. Kay – Fundamentals of statistical signal processing, Vol. 1: Estimation Theory, Prentice Hall 1993
3. S. M. Kay – Fundamentals of statistical signal processing, Vol. 2: Detection Theory, Prentice Hall 1998
4. Monica Borda – Information Theory and Coding, Editura UT PRES, 2007
5. M. Simon, S, Hinedi, W, Lindsey – Digital Communications Techniques. Signal Design and Detection, Prentice Hall, 1994
6. M. Barkat – Signal Detection and Estimation, Artech House,1991
7. I.Sztojanov, I. Gavăt, I. Spânu, M. Bâtiu - Teoria Transmiterii Informaţiei- îndrumător de laborator, Litografia IPCN 1983, tradus in limba engleză, format pdf

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Competences acquired will be used in the following COR occupations (Electronics Engineer; Telecommunications Engineer; Electronics Design Engineer; System and Computer Design Engineer; Communications Design Engineer) or in the new occupations proposed to be included in COR (Sale Support Engineer; Multimedia Applications Developer; Network Engineer; Communications Systems Test Engineer; Project Manager; Traffic Engineer; Communications Systems Consultant).

10. Evaluations

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		The level of acquired theoretical knowledge and practical skills		Written exam composed of 4-5 theoretical subjects and 3-4 problems		75%
Applications		The level of acquired abilities		- Continuous formative evaluation consisting of 5 written lab tests		25%
10.4 Minimum standard of performance						
Correct answer of at least 3 theoretical subjects and 2 problems, and at least an average of 5 (out of 10) at the laboratory tests.						

Date of filling in 01.10.2014	Course responsible Professor Monica BORDA, PhD	Teachers in charge of applications Assistant Mihaela Cislariu, PhD Assistant Ioana Ilea

Date of approval
in the department
01.10.2014

Head of Communications Department
Professor Virgil DOBROTA, PhD