SYLLABUS

Discipline name	Digital Signal Processing
Profile	Electronics and Telecommunications Engineering
Specialization	Telecommunications Technologies and Systems
Code	51324509
Course leader	Professor Corneliu Rusu, Ph.D – Corneliu.Rusu@bel.utcluj.ro
Collaborators	Assistant Lăcrimioara Grama – Lacrimioara.Grama@bel.utcluj.ro
Department	Basis of Electronics
Faculty	Electronics, Telecommunications and Information Technology

Sem.	Type of discipline	Course	Applications			Course	Applications			Ind. study	TOTAL	Credits	Form of assessment
		[hours/week]				[hours/sem.]							
			S	L	P		S	L	P				
7	**Engineering**	**2**	**-**	**2**	**-**	**28**	**-**	**28**	**-**	**64**	**120**	**4**	**Exam**

Acquired competences :
Acquired skills (what the student is able to do):
After completing the discipline, the students will be able to: - Distinguish between periodic signals and aperiodic signals analysis; - Identify the subsystems from a complex system; - Know the signification of some transforms; - Know the FIR and IIR filters characteristics; - Determine the FIR and IIR filters properties.
Acquired abilities: (what type of equipment/instruments/software the student is able to handle)
After completing the discipline, the students will be able to: – Use in applications the DSPs' catalog parameters; – Analyze and design some simple DSP systems.

Prerequisites (if necessary)
Knowledge of mathematics, digital electronics and signal theory.

A. Course/Lecture (course/lecture titles)	
1	Introduction
2	Discrete-time signals and systems
3	Frequency analysis for signals and systems
4	*Z*-transform and analysis of linear time invariant systems
5	Design of linear time invariant systems
6	Sampling of signals in frequency domain
7	Implementation of linear time invariant systems
8	System deconvolution
9	Discrete Fourier transform
10	Fast Fourier transform
11	Design of Finite Impulse Response filters
12	Design of Infinite Impulse Response filters
13	Hardware issues in DSP systems design
14	Software issues in DSP systems design

B1. Applications – **Laboratory** (list of laboratories), **Seminar** (contents), **Project** (project contents)	
1	Introduction to MATLAB
2	Discrete time signals
3	Analog signals sampling
4	Discrete linear time invariant systems
5	Linear and circular convolution
6	Discrete Fourier transform
7	Finite impulse response filters
8	Discrete linear time invariant systems as frequency selective filters
9	Infinite impulse response filters. Indirect design methods
10	Infinite impulse response filters. Direct design methods

11	Implementation structures for finite impulse response filters
12	Implementation structures for infinite impulse response filters
13	Effects to quantization of digital filters coefficients
14	Round-off quantization effects to digital filters

C. Individual study (reference study contents, synthesis materials, projects, applications etc.)

Design of a digital filter (laboratory homework)
1 set of problems (course homework)

Individual study structure	Course study	Problem solving, laboratory, project	Applications preparation	Examination time	Additional reference study	Total no. of individual study hours
Hours	20	28	8	4	4	64

References (Textbooks, courses, laboratory manual, exercise book)

1. S. Mitra – *Digital Signal Processing – A Computer Based Approach,* McGraw Hill, 2002.
2. J. G. Proakis, D. G. Manolakis – *Digital Signal Processing – Principles, algorithms and Applications,* Prentice Hall International, 1996.
3. C. Rusu – *Prelucrarea numerică a semnalelor,* Editura Risoprint, 2002.
4. C. Rusu – *Prelucrări digitale de semnale,* Editura Risoprint, 2000.
5. C. Rusu – *Primii paşi în prelucrarea numerică a semnalelor,* Editura Risoprint, 1996.
6. L. Grama, C. Rusu – *Prelucrarea numerică a semnalelor – Aplicaţii şi probleme*, Ed. UTPRESS, 2008.
7. L. Grama, A. Grama, C. Rusu – *Filtre numerice – Aplicaţii şi probleme*, Ed. UTPRESS, 2008.

Other references

1. C. Rusu – *Digital Signal Processing – transparencies ,* UTCN, 2008.
2. L. Grama – *Laboratory manual*, UTCN, 2008

Final evaluation	
Evaluation method	Written exam (E): problem solving (100%).
Mark components	Exam (E: 0…10 points); Laboratory (L: 0…10 points).
Mark computation	M = 0.5E + 0.5L. Pass if: E≥5 and L≥5.

Course leader,

Prof. Corneliu RUSU, Ph.D.