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	Telecommunications Technologies and Systems
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-E52.20

2. Data about the subject

2.1	Subject name					Digital Signal Processors					
2.2	Subject area					Electronics and Telecommunications Engineering					
2.3	Course responsible/lecturer					Professor Eugen LUPU, PhD					
2.4	Teachers in charge of applications					Assoc. Professor Simina EMERICH, PhD					
2.5	Year of study	II	2.6	Semester	1	2.7	Assessment	Exam	2.8	Subject category	DID/DOB

3. Estimated total time

Year/ Sem.	Subject name	No. of weeks	Course [hours/ week]	Applications [hours/ week]			Course [hours/ semester]	Applications [hours/ semester]			Indiv. study	TOTAL	Credits
				S	L	P		S	L	P			
II/1	Digital Signal Processors	14	2		1	1	28		14	14	22	78	3

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	8
Supplementary study in the library, online and in the field	-
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	8
Tutoring	3
Exams and tests	3
Other activities	

3.7	Total hours of individual study	22
3.8	Total hours per semester	78
3.9	Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	N.A.
4.2	Competence	Microprocessors basics, Signal Processing, Programming

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.
Cross competences	N.A.

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

7.1	General objectives	Developing the competences regarding the use and programming of Digital Signal Processors.
7.2	Specific objectives	1. Understanding basic concepts specific to DSPs architecture and programming. 2. Assimilation of theoretical knowledge on the use and programming of DSP using simulation software and programming (Code Composer Studio, Matlab etc.) 3. Obtaining skills and abilities needed to implement and test the developed applications on TI DSPs

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Course description. Evaluation mode. General features of digital signal processors (DSP) . Digital versus analog processing. Typical DSP algorithms . Other possible architectures to develop applications of digital signal processing (ASIC , FPGA , ASSP , GPP) . Families of digital signal processors company Texas Instruments (TMS320). Applications on DSP .	Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation	Use of .pptx presentation, projector, blackboard
2	Parallelism in digital signal processing . Processing Architectures (von Neumann , Harvard , SISD , ...). The goals of parallelism. Special architectures in digital signal processing .Components and architectures used in digital signal processing .		
3	Digital Signal Processing . Overview. Principles and algorithms.		
4	Introduction to digital signal processors . Texas Instruments TMS320 DSP families . Overview of TMS320C25 . Pins and signals. The internal architecture.		
5	TMS320C25 programming. Addressing modes (immediate, direct, indirect) . FFT algorithm. "Bit -reverse" addressing. C2x instruction set overview .		
6	Application Development on C2x . Using timer and interrupt system . Sine Generators. FIR filters . Examples of implementation.		
7	First continuous assessment		
8	TMS320C5x family . Enhancements to the C2x architecture. Areas of application .		
9	C5000 family overview. DSP for communications.		
10	TMS320C5416 processor . Architecture . Memory map . Interrupts System. Peripherals.		
11	TMS320C5416 processor . The instruction set. Examples.		
12	TMS320C55x family . Enhancements to the C54x architecture.		
13	Performance digital signal processors . VLIW architecture presentation. TMS320C6X family . Overview .		
14	Second continuous assessment		
8.2. Applications (lab)		Teaching methods	Notes
1	Numbers representation and arithmetic for DSP. Q15 format.	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, experimental boards, computers, magnetic board
2	Simulation applications for the DSP family TMS320C2x.		
3	SIDERAL TMS320C25 application board		
4	Applications development under CCS. C54xx Simulator.		
5	System development kit TMS320C5416		
6	TMS320C5416 DSK application development system		
7	Final evaluation , recoveries		
8.3. Project (prj) Examples of topics: application development platform in CCS C5416, C5510, C5505, C5515;Development of DSP applications in MATLAB (62x, 64x, 67x)		work monitoring, recommendation references	Use of laboratory instrumentation, experimental boards,
1	Theme setting, content and structure of the project.		
2	Documentation gathering and study		
3	Learning to use platforms and software tools		
4	Establishing organizational applications, application development		
5	Application development on the selected plaform		
6	Testing the application		
7	Project defending		

Bibliography

1.Lupu, E. s.a *Procesoare digitale de semnal . Familia TMS320C2X.Prezentare si aplicatii,* Promedia 1997
2.[***] TI User Manuals TMS320C2x, TMS320C5x, TMS320C54x, TMS320C62x
3. [***] www.ti.com
4. Nedevschi, S. *Procesoare de semnal. Familia C5x.Curs,* UT Pres 1997
5. Arsinte, R. – *Arhitecturi paralele şi procesoare de semnal*, Ed. Politehnica Timişoara 2000
6. [***] www.bdti.com
7. Smith, S. W. The Scientist and Engineer's Guide to Digital Signal Processing, www.DSPguide.com
8. Marven, C. , Ewers, G. *A simple approach to DSP* Texas Instr. 1993
9. [***] TI educational electronic materials : C2000, C5000, C6000
SLIDES: http://users.utcluj.ro/~elupu/Curs/index.php?m=23&sm=4923

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		- 2 Summative evaluation written exam (theory and problems)		- E=T1+T2, max 10 pts. 70%
Applications		The level of acquired abilities		- Lab and project defending		- L+P, max. 10 pts. 30%
10.4 Minimum standard of performance						
$L+P \geq 5$, $E \geq 4.5$ and $0.7E+0.3(L+P) \geq 4.5$						

Date of filling in
01.10.2018

Course responsible
Professor
Eugen LUPU, PhD

Teachers in charge of applications
Assoc. Professor
Simina EMERICH, PhD