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	Applied Electronics
1.4	Field of study	Electronics and Telecommunications Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Technologies and Telecommunication Systems
1.7	Form of education	Full time
1.8	Subject code	TST-E46.20

2. Data about the subject

2.1	Subject name					Applied Electronics					
2.2	Subject area					Electronics and Telecommunications Engineering					
2.3	Course responsible/lecturer					Assoc.Prof. Liviu Marin Viman, PhD					
2.4	Teachers in charge of applications					Assoc. Prof. Liviu Marin Viman, PhD					
2.5	Year of study	IV	2.6	Semester	1	2.7	Assessment	Verif.	2.8	Subject category	DS/DOP

3. Estimated total time

Year/ Sem.	Subject name	No. of weeks	Course [hours/week]	Applications [hours/week]			Course [hours/sem.]	Applications [hours/sem.]			Indiv. study	TOTAL	Credits
				S	L	P		S	L	P			
IV/I	Applied Electronics	14	2		2		28		28		48	104	4

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	26
Supplementary study in the library, online and in the field	4
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
Tutoring	2
Exams and tests	2
Other activities	-

3.7	Total hours of individual study	48
3.8	Total hours per semester	104
3.9	Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	Spectral analysis of signals, sampling and quantization of signals. Analysis and design of circuits with transistors and operational amplifiers. Getting of boolean algebra. Analysis and synthesis of combinational and sequential digital circuits.
4.2	Competence	Using the computers, the laboratory equipment (multimeter, oscilloscope, etc)

5. Requirements (where appropriate)

5.1	For the course	Amphitheatre, Cluj-Napoca
5.2	For the applications	Laboratory, Cluj-Napoca

6. Specific competences

Professional competences	Theoretical knowledge (what the student must know):	- Spectral analysis of signals, sampling and quantization of signals. - Analysis and design of circuits with transistors and operational amplifiers. - Getting of boolean algebra. - Analysis and synthesis of combinational and sequential digital circuits.
	Acquired skills (what the student is able to do):	After completing the discipline, the students will be able to: - understand how to represent the numbers in electronic systems, to recognize the most used codes, to apply the conversion algorithms of values between different codes; - understand the significance of catalog parameters for DA and AD converters circuits; - choose the type of circuit (operating principle) and the circuit (depending on the performance) suitable for a particular application; - analyze, based on structure, the operation and performance of a data acquisition system; - Develop the specification of the software program for data acquisition system;
	Acquired abilities: (what type of equipment the student is able to handle)	After completing the discipline, the students will be able to: - use the computer simulation programs and the laboratory instruments (virtual) (power supply, oscilloscope, logic analyzer, signal generator, multimeter) for troubleshooting and analysis of the data propagation in the data acquisition systems; - use the data sheets (print or online) in order to select the appropriate circuit to a required application.
	In accordance with Grila1 and Grila2 RNCIS	C2. To apply basic methods for signal acquisition and processing C3. To apply knowledge, concepts and basic methods regarding computing systems' architecture, microprocessors, microcontrollers, programming languages and techniques
Cross competences (Grila1 and Grila2 RNCIS)		N.A.

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

7.1	General objectives	Developing skills in the field of analysis and the design of mixed analog-digital circuits and data acquisition systems.
7.2	Specific objectives	1. Assimilation of theoretical knowledge regarding the structure and the performance of the A/D and D/A conversion circuits. 2. Assimilation of theoretical knowledge on the functioning and performances of the support circuits for DAC and ADC. 3. Obtaining the necessary skills to: develop, designing (and computer aided design) and analyze the data acquisition systems.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introduction to DASF. Analog and digital quantities. Logical levels. Binary representations.	Presentation, heuristic conversation, exemplification, teaching exercise, case study, formative evaluation	Use of .ppt presentation, projector, blackboard
2	DAC (Digital to Analog Converter): definitions, static and dynamic parameters, errors.		
3	Weighted resistor networks. R/2R resistor networks.		
4	Examples of intergrated DAC circuits: caracteristics, applications.		
5	ADC (Analog to Digital Converter): definitions, static and dynamic parameters, errors.		
6	Parallel ADC. Feedback ADC.		
7	Intermediate quantity ADC. Dual slope ADC.		
8	Sigma-Delta ADC: caracteristics, applications.		
9	Support circuits for DAC and ADC. Signal conditioning circuits.		
10	Principles of measurement of the temperature sensors. The design of data acquisition systems for instrumentation		
11	Power supply design for the data acquisition systems.		
12	Software for the data acquisition systems. Testing the data acquisition systems.		
13	Technology of the data acquisition systems. PCB designing. Terms of design for user interaction.		
14	Recapitulation. Preparation for the final exam.		

8.2. Applications (lab.)		Teaching methods	Notes
1	Signal sampling and re-building simulation.	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, experimental boards, computers
2	Binary representation of integers. Normalized values.		
3	**T1.** Binary representation of integers.		
4	DAC simulation.		
5	**T2.** Identifying DAC parametres based on time wave shapes.		
6	ADC simulation.		
7	**T3.** Identifying ADC parametres based on time wave shapes.		
8	The short circuit defect in the operation of logic circuits.		
9	The defects generated by wrong logical impulse		
10	Defects in the signals on long lines.		
11	IEEE 1149.1 standard.		
12	IDDQ test method.		
13	**T4**. Test methods.		
14	Lab recovery and finalization of laboratory activity		

Bibliography

1. M. Dăbâcan – Data Acquisition Systems Fundamentals, Casa Cărţii de Ştiinţă, ISBN 973-686-566-5, 295 pagini, Cluj-Napoca, 2004.
2. Richard C. Dorf – Modern Control Systems - ISBN 0-13-145733-0 (2005)
3. Robert Oshana, Mark Kraeling – Software Engineering for Embedded Systems – Methods Practical Techniques and Applications, Elsevier, ISBN: 978-0-12-415917-4, 2013.

On-line references

4. L. Viman. Applied Electronics (course slides, laboratories, problem examples, exam subjects)
5. M. Dăbâcan, L. Viman - "Data Acquisition Systems Fundamentals – Lab Themes ", UTCN, site: http://www.ael.utcluj.ro/ORGANIZARE/curs_BSAD.HTML , 45 pagini, Cluj-Napoca, 2003.

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		Summative evaluation written exams (E1 and E2)		65%
Applications		The level of acquired abilities		practical lab test (T1, T2, T3 and T4)		35%
10.4 Minimum standard of performance						
L≥5 (L=(T1+T2+T3+T4)/4) and E1,E2≥4 and NF≥4.5 where NF=0.35*L +0.65*(E1+E2)/2.						

Date of filling in
1.10.2018

Course responsible
Assoc. Prof. Liviu Viman, PhD

Teachers in charge of applications
Assoc. Prof. Liviu Viman, PhD