SYLLABUS

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and information Technology
1.3 Department	Applied Electronics
1.4 Field of study	Electronic Engineering, Telecommunications and Information Technologies
1.5 Cycle of study	Bachelor of Science
1.6 Program of study / Qualification	Telecommunications Technologies and Systems/ Engineer
1.7 Form of education	Full time
1.8 Subject code	TST-E53.20

2. Data about the subject

2.1 Subject name	Applied Electronics						
2.2 Subject area	Electronics and Telecommunications Engineering						
2.3 Course responsible	Assoc. Prof. Liviu Viman, PhD – liviu.viman@ael.utcluj.ro						
2.4 Teacher in charge with laboratory	Assist. Prof. Mihai Daraban, PhD – mihai.daraban@ael.utcluj.ro						
2.5 Year of study	IV	2.6 Semester	8	2.7 Assessment	V	2.8 Subject category	DS/DO

3. Estimated total time

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3 seminar / laboratory	2
3.4 To Total hours in the curriculum	56	of which: 3.5 course	28	3.6 seminar / laboratory	28

Distribution of time	hours
Manual, lecture material and notes, bibliography	34
Supplementary study in the library, online specialized platforms and in the field	-
Preparation for seminars / laboratories, homework, reports, portfolios and essays	29
Tutoring	2
Exams and tests	4
Other activities:	-

3.7 Total hours of individual study	69
3.8 Total hours per semester	125
3.9 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1 curriculum	
4.2 competence	

5. Requirements (where appropriate)

5.1. for the course	Cluj-Napoca, sala 359, str. Baritiu 26-28
5.2. for the laboratories	Cluj-Napoca, sala 367, str. Baritiu 26-28

6. Specific competences

Professional competences	C2. Applying the basic methods for the acquisition and processing of signals. C2.1 Temporal, spectral and statistical characterization of signals. C2.2 Explaining and interpreting the methods of signal acquisition and processing C2.5 Design of basic functional blocks for digital signal processing with hardware and software implementation. C3. Application of the basic knowledge, concepts and methods regarding the architecture of computer systems, microprocessors, microcontrollers, languages and programming techniques. C4. Design and use of low complexity hardware and software applications specific to the applied electronics.
Cross competences	

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

7.1 General objective	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 ign.		

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.		

Bibliography

1. M. Dăbâcan – Data Acquisition Systems Fundamentals, Casa Cărţii de Ştiinţă, ISBN 973-686-566-5, 295 pagini, Cluj-Napoca, 2004.
2. Liviu Viman, Septimiu Pop, Ioan Ciascai - Sisteme de achiziție de date – Măsurarea traductoarelor cu coardă vibrantă și rezistive din construcțiile hidrotehnice, Cluj-Napoca, Romania, Ed. Mediamira, 229 pagini, ISBN: 978-973-713-332, 2015.
3. Jack Ganssle [et al.] – Embedded Hardware: Know It All, Newnes, ISBN: 978-0-7506-8584-9, 2008.
4. Robert Oshana, Mark Kraeling – Software Engineering for Embedded Systems – Methods Practical Techniques and Applications, Elsevier, ISBN: 978-0-12-415917-4, 2013.
5. L. Viman. Applied Electronics (course slides, laboratories, problem examples, exam subjects)
6. 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.
7. On – line references.

8.3 Laboratory	Teaching methods	Notes
1. Signal sampling and re-building simulation.	Didactic and experimental proof, didactic exercise, team work	
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. EEE 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. Liviu Viman, Septimiu Pop, Ioan Ciascai - Sisteme de achiziție de date – Măsurarea traductoarelor cu coardă vibrantă și rezistive din construcțiile hidrotehnice, Cluj-Napoca, Romania, Ed. Mediamira, 229 pagini, ISBN: 978-973-713-332, 2015.

3. L. Viman. Applied Electronics (course slides, laboratories, problem examples, exam subjects)
4. . M. Dăbâcan, L. Viman - "Data Acquisition Systems Fundamentals – Lab Themes ", UTCN, site:
5. 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

The discipline content and the acquired skills are in agreement with the expectations of the professional organizations and the employers in the field, where the students carry out the internship stages and/or occupy a job (in the field of *design of electronic circuits*), and the expectations of the national organization for quality assurance (ARACIS).

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The level of acquired theoretical knowledge and practical skills	Summative evaluation written exams (E1 .and E2)	*65%*
10.5 Laboratory	The level of acquired knowledge and abilities	Laboratory tests (T1, T2, T3 and T4)	*35%*

10.6 Minimum standard of performance

Qualitative level:

Minimal knowledge:

- ✓ *Knowledge of the methods of numerical representation specific to the transport of information through electronic circuits*
- ✓ *Knowledge of the main properties and performances of the support circuits for ADC and DAC.*
- ✓ *Knowledge of the main properties of the support circuits for CAN and CAN.*
- ✓ *Knowledge of the properties and characteristics of the functional blocks from the data acquisition systems structure.*
- ✓ *Knowledge of software techniques specific to data acquisition systems.*

Minimal skills:

- ✓ *To be able to use number representation methods.*
- ✓ *To be able to mention the main properties of the support circuits for ADC and DAC.*
- ✓ *To be able to specify the main features of the functional blocks from the data acquisition systems structure.*

Quantitative level:

- ✓ *Perform all laboratory work*
- ✓ *The exam and laboratory notes must be at least 5.*
- ✓ *The discipline note is calculated with the relation:*

0,65*Nota_examen+0,35*Nota_laborator where

- the laboratory note is calculated with the relation: **Nota_laborator=(T1+T2+T3+T4)/4)**
- the exam note is calculated with the relation: **Nota_examen=(E1+E2)/2)**

Date of filling in:	Responsible	Title Surname NAME	Signature
29.09.2020	Course	Assoc. Prof. Liviu Viman, PhD	
	Applications	Assist. Prof. Mihai Daraban, PhD	

Date of approval in the Department of Communications 30.09.2020	Head of Communications Department Prof. Virgil DOBROTA, Ph.D.
Date of approval in the Council of Faculty of Electronics, Telecommunications and Information Technology 30.09.2020	Dean Prof. Gabriel OLTEAN, Ph.D.