SYLLABUS

1. Program information

1.1 Higher education institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and Information Technology
1.3 Department	Communications
1.4 Field of study	Electronic engineering, telecommunications and information technologies
1.5 Cycle of study	Bachelor of Science
1.6 Study program / Qualification	Telecommunications technologies and systems/ Engineer
1.7 Form of education	IF – full-time education

2. Course information

2.1 Course title	Applied electronics					Course code	53.20
2.2 Course coordinator	*Assoc.Prof. Liviu Viman, Ph.D. – Liviu.Viman@ael.utcluj.ro*						
2.3 Seminar/ laboratory/ project/ practical activity coordinator	*Assoc.Prof. Liviu Viman, Ph.D. – Liviu.Viman@ael.utcluj.ro* *Assoc.Prof. Daraban Mihai, Ph.D. – mihai.daraban@ael.utcluj.ro*						
2.4 Year of study	4	2.5 Semester	2	2.6 Type of assessment			V
2.7 Course status	Formative category						DS
	Optionality						DOP

3. Estimated total time

3.1 Hours per week	4	of which:	3.2 Lecture	2	3.3 Seminar	0	3.3 Laboratory	2	3.3 Project	0	3.3 Practical training	0
3.4 Hours per semester	56	of which:	3.5 Lecture	28	3.6 Seminar	0	3.6 Laboratory	28	3.6 Project	0	3.3 Practical training	0

3.7 Time distribution (hours per semester) for individual study and assessment:	
(a) Assessment	2
(b) Study using textbook, course materials, bibliography, and notes	49
(c) Additional documentation in the library, on specialized electronic platforms, and in the field	-
(d) Preparation for seminars/laboratories, assignments, reports, portfolios and essays	14
(e) Tutoring	4
(f) Other activities	-
3.8 Total hours of individual study and assessment (sum of (3.7(a)...3.7(f))	69
3.9 Total hours per semester (3.4+3.8)	125
3.10 Number of credits	5.0

4. Prerequisites (where applicable)

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 competencies	Using the computers

5. Requirements (where applicable)

5.1. for the development of the lecture	
5.2. for the development of the seminar/ laboratory/ project	

6. Specific competencies acquired

Professional competencies	C2. Application of basic methods for signal acquisition and processing C2.1 Time-domain, spectral and statistical characterization of signals C2.2 Explanation and interpretation of signal acquisition and processing methods C2.3 Use of simulation environments for signal analysis and processing C2.5 Design of elementary functional blocks for digital signal processing with hardware and software implementation C3. Application of basic knowledge, concepts and methods related to computer-system architecture, microprocessors, microcontrollers, programming languages and techniques C4. Design and use of low-complexity hardware and software applications specific to applied electronics
Transversal competencie	

7. Expected learning outcomes

Knowledge	- The student/graduate describes, identifies and summarizes elementary concepts and methods for signal acquisition, analysis and processing, implemented in systems with general-purpose processors or signal processors, as well as their application in concrete problems.
Skills	- The student/graduate designs low/medium-complexity functional blocks for digital signal analysis and processing and implements them on signal processors, microcontrollers or dedicated processors.

Responsibility and autonomy	- The student/graduate shows initiative and proactivity in updating professional, economic and organizational culture knowledge.

8. Course objectives (based on the grid of specific competencies acquired)

8.1 General objective of the course	The development of skills in designing, modeling and simulation of mixt (analog and digital) electronic circuits and systems
8.2 Specific objectives	1. Understanding the types type, structure and performances of AD/DA conversion circuits. 2. Specify, design, analyze and test the data acquisition system based on application requirements

9. Contents

9.1 Lecture	**No. of hours**	**Teaching methods**	**Remarks**
1. Introduction to DASF. Analog and digital quantities. Logical levels. Binary representations.	2	Exposure,discussion, interactive teaching style	Video-projector
2. DAC (Digital to Analog Converter): definitions, static and dynamic parameters, errors.	2		
3. Weighted resistor networks. R/2R resistor networks. Combined resistor networks.	2		
4. Electronic devices in the DAC structure: characteristics, performances. Applications.	2		
5. ADC (Analog to Digital Converter): definitions, static and dynamic parameters, errors.	2		
6. Parallel ADC. Feedback ADC.	2		
7.Intermediate quantity ADC. Dual slope ADC.	2		
8. Sigma-Delta ADC: caracteristics, applications.	2		
9. Support circuits for CNA and CAN. Voltage references. Output circuits.	2		
10. Principles of measurement of the temperature sensors. The design of data acquisition systems for instrumentation	2		
11. Design of acquisition systems for instrumentation	2		
12. Power supply design for the data acquisition systems.	2		
13. Software for the data acquisition systems. Testing the data acquisition systems.	2		
14. Technology of the data acquisition systems. PCB designing. Terms of design for user interaction.	2		
Bibliography 1. M. Dăbâcan, – “Bazele sistemelor de achiziţie de date”, Editura Casa Cărţii de Ştiinţă, ISBN 973-686-565-7, 295 pagini, Cluj-Napoca, 2004.			

9.1 Lecture	No. of hours	Teaching methods	Remarks
2. M. Dăbâcan, – "Data Acquisition Systems Fundamentals", Editura Casa Cărţii de Ştiinţă, ISBN 973-686-566-5, 295 pagini, Cluj-Napoca, 2004. 3. Liviu Viman, Vlad Veliciu, Vlad Bande - Bazele Sistemelor de achiziții de date – De la teorie la practică, material în curs de publicare, 203p, Cluj-Napoca, 2026. 4. Materiale didactice virtuale			

9.2 Seminar /laborator /proiect /practical training	No. of hours	Teaching methods	Remarks
Laborator		Exposure and applications of discovery learning, exercise, learning on didactic simulators, computer-assisted instruction. Laboratory supervisor.	Computer, specific program
1. Signal sampling and re-building simulation.	2		
2. Binary representation of integers. Normalized values	2		
3. **T1.** Binary representation of integers.	2		
4. DAC simulation.	2		
5. **T2.** Identifying DAC parametres based on time wave shapes	2		
6. ADC simulation	2		
7. **T3.** Identifying ADC parametres based on time wave shapes.	2		
8. The short circuit defect in the operation of logic circuits.			
9. The defects generated by wrong logical impulse	2		
10. Defects in the signals on long lines.	2		
11. IEEE 1149.1 standard.	2		
12. IDDQ test method.	2		
13. **T4.** Test methods.	2		
14. Lab recovery and finalization of laboratory activity	2		
Bibliography 1. M. Dăbâcan, L. Viman - "Bazele Sistemelor de Achiziţie de Date - Set lucrări laborator", UTCN, site: http://www.ael.utcluj.ro/ORGANIZARE/curs_BSAD.HTML , 45 pagini, Cluj-Napoca, 2003. 2. 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. 3. Liviu Viman, Vlad Veliciu, Vlad Bande - Bazele Sistemelor de achiziții de date – De la teorie la practică, material în curs de publicare, 203p, Cluj-Napoca, 2026.			

10. Alignment of the course contents with the expectations of the epistemic community, professional associations, and representative employers in the field related to the program

The course content and the teaching-learning-assessment methods are aligned with the current requirements of the Electronics, Telecommunications, and Information Technology Engineering field, considering the expectations of the academic and professional community, representative employers, as well as the national quality assurance standards in higher education. The course helps prepare students in line with employer expectations and the quality requirements set for engineering study programs.

11. Assessment

Activity type	**11.1 Assessment criteria**	**11.2 Assessment methods** (and type of assessment: continuous/ summative)	**11.3 Weight in final grade**
11.4 Lecture	Problem solving + answers to theory questions	Summative evaluation written exams (E1 and E2)	65%
11.5 Laboratory	**The level of acquired abilities**	practical lab test (T1, T2, T3 and T4)	35%

11.6 Minimum performance standard

Qualitative level:

Minimum knowledge:

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

Minimum skills:

- Be able to use number representation methods.
- Be able to list the main properties of support circuits for CAN and CNA.
- Be able to specify the main characteristics of functional blocks in the structure of data acquisition systems.

Quantitative level:

- The exam and laboratory grades must be at least 5.
- The subject grade is calculated with the relationship: **N = (0.65*E+0.35*L) ⩾5** where:

- the lab grade is calculated with the relationship**: L=(T1+T2+T3+T4)/4)**
- the exam grade is calculated with the relationship: **E=(E1+E2)/2)**

Completion date:	**Course coordinators**	**teaching rank, title First name LAST NAME**	**Signature**
23.06.2026	Lecture	Assoc.Prof. Liviu VIMAN, Ph.D.	
	Applications	Assoc.Prof. Liviu VIMAN, Ph.D.	
		Assoc.Prof. Mihai DĂRĂBAN, Ph.D.	

Approval of the Head of the Department coordinating the course, only if this differs from the department organizing the study program	Head of the Applied Electronics Department Prof. Dorin PETREUȘ, Ph.D.

Date of approval by the Council of the Department of Communications 26.06.2026	Head of the Communications Department Prof. Virgil DOBROTĂ, Ph.D.
Date of approval by the Council of the Faculty of Electronics, Telecommunications and Information Technology 30.06.2026	Dean, Prof. Ovidiu-Aurel POP, Ph.D.