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	Applied Elects / Engineer
1.7 Form of education	Full time
1.8 Subject code	56.20

2. Data about the subject

2.1 Subject name	Data Acquisition Systems						
2.2 Subject area	Electronic and Telecommunications Engineering						
2.3 Course responsible	Assoc. Prof. Viman Liviu, PhD Eng. – liviu.viman@ael.utcluj.ro						
2.4 Teacher in charge with seminar / laboratory / project	Assoc. Prof. Viman Liviu, PhD Eng. – liviu.viman@ael.utcluj.ro Assoc. Prof. Pop Septimiu, PhD Eng. – septimiu.pop@ael.utcluj.ro Assist. Prof. Baciu Ionel, PhD Eng. – ionel.baciu@ael.utcluj.ro						
2.5 Year of study	IV	2.6 Semester	2	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	70	of which: 3.5 course	28	3.6 seminar / laboratory	42

Distribution of time	hours
Manual, lecture material and notes, bibliography	37
Supplementary study in the library, online specialized platforms and in the field	-
Preparation for seminars / laboratories, homework, reports, portfolios and essays	14
Tutoring	2
Exams and tests	2
Other activities:	-

3.7 Total hours of individual study	55
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	Amphitheatre, Cluj-Napoca
5.2. for the laboratories / projects	Laboratory, Cluj-Napoca

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 Use of simulation environments for signal analysis and processing • C2.3 Use of simulation media for signal analysis and processing • C2.4 Use of specific methods and tools for signal analysis 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	N.A.

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

7.1 General objective	Developing skills regarding analysis and design of the data acquisition systems
7.2 Specific objectives	1. Assimilation of theoretical knowledge on the functioning and performances of the support circuits for DAC and ADC. 2. 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. Defining a Data Acquisition System. Specific Parameters.	Presentation, heuristic conversation, exemplification, teaching exercise, case study,	Use of .ppt presentation, projector
2. Adapting the Data Acquisition System to the required application.		
3. Data Acquisition System Structure. Informational path.		
4. Intermediate data processing.		
5. Specifying the structural blocks.		
6. Performance / structure / price ratio.		
7. Conditioning stages design.		
8. ADC design.		

9. DAC and output amplifiers design.		
10. Embedded system design.		
11. Communication paths. Distributed Data Acquisition System.		
12. Block and system calibration. Functional and performance analyzis.		
13. Data Acquisition System software component.		
14. Recapitulation. Preparation for the final exam.		
8.2 Project	Teaching methods	Notes
1. Defining a Data Acquisition System. Specific Parameters.	Presentation, exemplification, case study	
2. Data Acquisition System Structure. Informational path.		
3. Conditioning stages design.		
4. Variable gain amplifiers ADC design.		
5. Embedded system design.		
6. Processing and displaying data.		
7. Project presentation. Evaluation (P).		
8.3 Laboratory	Teaching methods	Notes
1. General presentation of LabVIEW FPGA and SPARTAN-3E Starter Kit board	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, experimental boards, computers
2. LabVIEW FPGA project implementation .		
3. Events counter for the rotary encoder.		
4. Digital thermometer.		
5. Signal generator.		
6. LCD controller.		
7. 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. Liviu Viman, Septimiu Pop – DATA ACQUISITION SYSTEMS – Applications development with LabVIEW FPGA and Spartan-3E Starter Kit Board, Cluj-Napoca, Romania: U.T.PRESS, 97 pagini, ISBN: 978-606-737-043-02015, 2015.
4. Jack Ganssle… [et al.] – Embedded Hardware: Know It All, Newnes, ISBN: 978-0-7506-8584-9, 2008.
5. Robert Oshana, Mark Kraeling – Software Engineering for Embedded Systems – Methods Practical Techniques and Applications, Elsevier, ISBN: 978-0-12-415917-4, 2013.
6. On – line references.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The skills acquired will be necessary for employees working in the field of designing electronic circuits.

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 exam (E).	40%
10.5.1 Laboratory	The level of acquired knowledge and abilities	Laboratory tests (T1, T2, T3)	30%
10.5.2 Project	The level of acquired knowledge and abilities	Evaluation (P)	30%
10.6 Minimum standard of performance			

Qualitative level:

Minimal knowledge:

- ✓ Knowledge of the main properties and performances of the support circuits for ADC and DAC.
- ✓ Knowledge of the properties and characteristics of the functional blocks from the data acquisition systems structure
- ✓ Knowledge of the software interaction techniques with data acquisition systems

Minimal skills:

- ✓ 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:

0,4*Nota_examen+0,3*Nota_laborator+0,3*Nota_proiect where the laboratory note is calculated with the relation: **Nota_laborator=(T1+T2+T3)/3)**

Date of filling in:	**Responsible**	**Title Surname NAME**	**Signature**
21.09.2022	Course	Assoc. Prof. Viman Liviu, PhD Eng.	
	Applications	Assoc. Prof. Viman Liviu, PhD Eng.	
		Assoc. prof. Pop Septimiu, PhD Eng.	
		Assist. Prof. Baciu Ionel, PhD Eng.	

Date of approval in the Department of Applied Electronics 15.09.2022	Director Departament EA Prof.dr.ing. Dorin PETREUS
Date of approval in the Council of Faculty of Electronics, Telecommunications and Information Technology 21.09.2022	Director Departament EA Prof.dr.ing. Dorin PETREUS.