COURSE SYLLABUS

Academic year 2024-2025

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Department of Computer Science and Electrical and Electronics Engineering
1.4. Field of study	Computer Science and Information Technology
1.5. Level of study[1]	Master
1.6. Programme of study/qualification	EMBEDDED SYSTEMS

2. Course Information

2.1. Name of course	Distributed Intelligent Sensors and Measurement Systems			Code	ES.307.RU
2.2. Course coordinator	Assoc. Prof. Mihai BOGDAN, PhD				
2.3. Seminar/laboratory coordinator	Assoc. Prof. Mihai BOGDAN, PhD				
2.4. Year of study[2]	2	2.5. Semester[3]	3	2.6. Evaluation form[4]	E
2.7. Course type[5]	U	2.8. The formative category of the course[6]			R

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	2	0	0	**4**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	28	0	0	**56**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	10
Additional learning by using library facilities, electronic databases and on-site information	11
Preparing seminars / laboratories, homework, portfolios and essays	56
Tutorial activities[9]	14
Exams[10]	3
3.3. Total Individual Study Hours[11] ($NOSI_{sem}$)	**94**
3.4. Total Hours in the Curriculum ($NOAD_{sem}$)	**56**
3.5. Total Hours per Semester[12] ($NOAD_{sem} + NOSI_{sem}$)	**150**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**6**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	
4.2. Competencies	

5. Conditions (where applicable)

5.1. For course/lectures[15]	video projector, internet access
5.2. For practical activities (lab/sem/pr/app)[16]	computer network, internet access

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			6	Credits distribution by competencies[19]
6.1. Professional competencies	PC10	design hardware		3
	PC14	test hardware		3
6.2. Transversal competencies				

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Develop knowledge in the fields of electrical and electronic engineering, computer-aided design techniques, and the design, implementation, testing, use and maintenance of systems with intelligent sensor equipment.
7.2. Specific course objectives	Developing applications in software and hardware environments specific to smart sensor technology.

8. Content

8.1 Lectures[20]		**Teaching methods[21]**	**Hours**
Lecture 1	Main physical laws and quantities specific to sensor	Exposition	2
Lecture 2	Introduction to LabVIEW. Components of a VI. Front Panel.	Exposition	2
Lecture 3	Block Diagram	Exposition	2
Lecture 4	Channels and tasks in LabVIEW. Creating tasks in MAX. Using tasks created in MAX in the LabVIEW environment. Creating tasks in the LabVIEW environment - DAQ Assistant Express VI.	Exposition	2
Lecture 5	Using the DAQmx Library to acquire samples from an analog signal	Exposition	2
Lecture 6	Connecting analog voltage signals to the input of a DAQ module. Setting up an analogue voltage measurement. Continuous acquisition of an analogue signal and generation of a digital signal. Using the Virtual Channel created in MAX, in LabVIEW.	Exposition	2
Lecture 7	Generating analog voltage signals at the output of a DAQ module. Configuring an analogue voltage output. Step generation of a voltage. Using the Virtual Channel created in MAX, in LabVIEW.	Exposition	2
Lecture 8	Verification work	Exposition	2
Lecture 9	Connecting current signals to a DAQ module. Setting up a current measurement. Continuous acquisition of a current and generation of a	Exposition	2

	digital signal. Using the Virtual Channel created in MAX, in LabVIEW.		
Lecture 10	Connecting a thermocouple to a DAQ module. Fundamentals of thermocouple measurement. Setting up a thermocouple measurement. Continuous temperature acquisition and generation of a digital signal. Using the Virtual Channel created in MAX in LabVIEW.	Exposition	2
Lecture 11	Connecting strain gages to a DAQ device. Principles of strain measurement. Setting up a strain measurement. Continuous strain acquisition and generation of a digital signal. Using the Virtual Channel created in MAX, in LabVIEW.	Exposition	2
Lecture 12	Connecting accelerometers to a DAQ module. Fundamentals of acceleration measurement. Setting up accelerometer measurement. Continuous acceleration acquisition and generation of a digital signal. Using the Virtual Channel created in MAX in LabVIEW.	Exposition	2
Lecture 13	Connecting digital input signals to a DAQ module. Fundamentals of measuring digital inputs. Setting up a digital input. Signal testing. Implementing a virtual instrument for reading digital values.	Exposition	2
Lecture 14	Connecting digital output signals to a DAQ module. Fundamentals of digital output measurement. Setting up a digital output. Signal testing. Implementing a virtual tool for writing digital values.	Exposition	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.b. Laboratory		**Teaching methods**[22]	**Hours**
Laboratory 1	Introduction to LabVIEW programming environment	Experiment	2
Laboratory 2	Signal acquisition in LabVIEW from a simulated DAQ.	Experiment	2
Laboratory 3	Channels and Tasks in NI-DAQmx	Experiment	2
Laboratory 4	Using the DAQmx Library to acquire samples from an analog signal	Experiment	2
Laboratory 5	Connecting analog voltage signals to the input of a DAQ device	Experiment	2
Laboratory 6	Generating analog voltage signals at the output of a DAQ device	Experiment	2
Laboratory 7	Connecting current signals to a DAQ device	Experiment	2
Laboratory 8	Connecting a thermocouple to a DAQ device	Experiment	2
Laboratory 9	Connecting strain gauges to a DAQ device	Experiment	2
Laboratory 10	Connecting accelerometers to a DAQ device	Experiment	2
Laboratory 11	Connecting digital input signals to a DAQ device	Experiment	2
Laboratory 12	Connecting digital output signals to a DAQ device	Experiment	2
Laboratory 13	Exam	Experiment	2
		Total laboratory hours:	28

9. Bibliography

9.1. Recommended Bibliography	1. Mihai Bogdan – Senzori inteligenți și sisteme distribuite de măsură, Note de curs, 2019. 2. LabVIEW for Everyone: Graphical Programming Made Easy and Fun, Third Edition, Publisher: Prentice Hall, Pub Date: July 27, 2006 3. LabVIEWTM Core 1 Participant Guide. Course Software Version 2014, November 2014 Edition, Part Number 326292A-01

9.2. Additional Bibliography	4. LabVIEW for Everyone: Graphical Programming Made Easy and Fun, Third Edition, Publisher: Prentice Hall, Pub Date: July 27, 2006 5. * * * - LabVIEW Measurements Manual, National Instruments, 2000 William C. Dunn - Introduction to Instrumentation, Sensors, and Process Control, Artech House sensors library, ISBN 1-58053-011-7, 2006

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[23]

By periodic formal and informal meetings with members of companies in the field.

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[24]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[25]:	0%	40%	CEF
		Homework:	0%		
		Other activities[26]:	0%		
		Final evaluation:	100%		
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		60%	CPE
11.5 Minimum performance standard[27] 5 grade at each component					

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: 09.09.2024

Department Acceptance Date: 16.09.2024

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	Assoc. Prof. Mihai BOGDAN, PhD	
Study Program Coordinator	Prof. Arpad GELLERT, PhD	
Head of Department	Assoc. Prof. Radu George CREȚULESCU, PhD	
Dean	Prof. Maria VINȚAN, PhD	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*

[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Practical demonstration, exercise, experiment*
[23] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[24] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[25] *The number of tests and the weeks in which they will be taken will be specified*
[26] *Scientific circles, professional competitions, etc.*
[27] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*