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	Master
1.6. Programme of study/qualification	EMBEDDED SYSTEMS

2. Course Information

2.1. Name of course	Microcontrollers in Automotive			Code	ES.207.RU
2.2. Course coordinator	Assist. Prof. Vlăduț Horia CĂPRIȚĂ, PhD				
2.3. Seminar/laboratory coordinator	eng. Vlăduț Horia CĂPRIȚĂ, PhD				
2.4. Year of study	1	2.5. Semester	2	2.6. Evaluation form	E
2.7. Course type	U	2.8. The formative category of the course			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
1	-	1	-	0	**2**
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
14	-	14	-	0	**28**

Time Distribution for Individual Study	**Hours**
Learning by using course materials, references and personal notes	20
Additional learning by using library facilities, electronic databases and on-site information	6
Preparing seminars / laboratories, homework, portfolios and essays	14
Tutorial activities	3
Exams	4

3.3. Total Individual Study Hours *($NOSI_{sem}$)*	**47**
3.4. Total Hours in the Curriculum *($NOAD_{sem}$)*	**28**
3.5. Total Hours per Semester *($NOAD_{sem}$ + $NOSI_{sem}$)*	**75**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits	**3**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)	Embedded Computing Embedded Systems Architecture
4.2. Competencies	C/C++/Assembly Programming skills

5. Conditions (where applicable)

5.1. For course/lectures	Scientific papers, video-projector, blackboard
5.2. For practical activities (lab/sem/pr/app)	Lab room with computers having installed the necessary software MCU 161/167 development kits Oscilloscopes Power sources Peripherics (sensors and actuators)

6. Specific competencies acquired

Number of credits assigned to the discipline			3	Credits distribution by competencies
6.1. Professional competencies	PC1	approve engineering design		0.5
	PC2	perform project management		0.5
	PC11	design prototypes		0.5
6.2. Transversal competencies	TC1	apply knowledge of science, technology and engineering		0.5
	TC2	show initiative		0.5
	TC3	assume responsibility		0.5

7. Course objectives (resulted from developed competencies)0.5

7.1. Main course objective	Introduction and evaluation of architectural paradigms and developments in the field of dedicated systems used in automotive. The specific architectural characteristics of microcontrollers used in automotive (Siemens C161-C167) as well as the programming techniques of these microcontrollers are presented.
7.2. Specific course objectives	• Understanding paradigms and architectural developments in the field of dedicated computing systems used in automotive. • Knowledge of dedicated application design techniques. • Developing the ability to apply effective methodologies for performance evaluation and architectural optimization of dedicated systems used in the automotive field.

8. Content

9. 8.1 Lectures		**Teaching methods**	**Hours**
Lecture 1	General Architecture of Microcontrollers (Introduction) Architectural features of C161/C167 microcontrollers	Exposition, Discussion	2
Lecture 2	C161 Central Processing Unit Memory organization within the C161 architecture	Exposition, Discussion	2
Lecture 3	The System of Interruptions and Exceptions related to the C161 microcontroller	Exposition, Discussion	2
Lecture 4	Interrupt Management in Microcontroller Based Applications/Systems	Exposition, Discussion	2

Lecture 5	Parallel Ports Using parallel ports in dedicated applications	Exposition, Discussion	2
Lecture 6	General Purpose Timers and the Watchdog Timer (WDT) Use of general-purpose timers and WDT timer in dedicated applications	Exposition, Discussion	2
Lecture 7	Programming techniques for systems based on microcontrollers Systems with real-time operation.	Exposition, Discussion	2
		Total lecture hours:	**14**

8.2.b. Laboratory		**Teaching methods**	**Hours**
Laboratory 1	Software environments for dedicated applications: Dave, Tasking, Flashtools (MCU C161 - C167)	Development, Experiment	2
Laboratory 2	Programming parallel ports	Development, Experiment	2
Laboratory 3	Programming and using timers	Development, Experiment	2
Laboratory 4	Programming the asynchronous serial interface	Development, Experiment	2
Laboratory 5	Synchronous serial interface programming	Development, Experiment	2
Laboratory 6	Handling external interrupts	Development, Experiment	2
Laboratory 7	Watch-dog timer programming	Development, Experiment	2
		Total laboratory hours:	14

10. Bibliography

10.1. Recommended Bibliography	C167 Derivatives 16-Bit CMOS Single-Chip Mcrocontrollers. User's Manual. Published by Siemens AG 1996.
	T. Noergaard, *Embedded Systems Architecture. A Comprehensive Guide for Engineers and Programmers*, Elsevier, 2005.
10.2. Additional Bibliography	R. Zurawski, *Embedded Systems Handbook*, Taylor&Francis Group, 2006.
	J. A. Fisher, P. Faraboschi, C. Young, *Embedded Computing*, Elsevier, 2005.
	J. Ganssle, *Embedded Systems. World Class Designs*, Newnes.

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

Curricula are continuously updated based on the most prestigious international text-books and also based on the most relevant progresses in this field (research projects and scientific papers).

12. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.
11.4a Exam / Colloquy	Theoretical knowledge acquired	Preparing a research topic	50%	60%	CPE
		Final evaluation	50%		
11.4c Laboratory	Practical knowledge acquired	Experimental works		40%	CPE
11.5 Minimum performance standard: 50% result after adding up the weighted scores					

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: 11.09.2024

Department Acceptance Date: 16.09.2024

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