SYLLABUS

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Electronics, Telecommunications and Information Technology
1.3 Department	Applied Electronics
1.4 Field of study	Electronic Engineering and Telecommunications
1.5 Cycle of study	Bachelor of Science
1.6 Program of study/Qualification	Telecommunications Technologies and Systems/ Engineer
1.7 Form of education	IF-Full time
1.8 Subject code	TST-E110.00

2. Data about the subject

2.1 Subject name	Microcontrollers						
2.2 Subject area	Theoretical area Methodological area Area of analysis						
2.3 Course responsible/lecturer	Prof. Dorin Petreus, Ph.D – dorin.petreus@ael.utcluj.ro						
2.4 Teachers in charge of applications	Assist. Prof. Radu Etz, Ph.D – radu.etz@ael.utcluj.ro						
2.5 Year of study	III	2.6 Semester	6	2.7 Assessment	E	2.8 Subject category	DD/DFac

3. Estimated total time

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	Applications	2
3.4	Total hours in the curriculum	56	3.5	of which, course	28	3.6	Applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	8
Supplementary study in the library, online and in the field	1
Preparation for seminars/laboratory works, homework, reports, portofolios, essays	8
Tutoring	1
Exams and tests	1
Other activities	-

3.7 Total hours of individual study	19
3.8 Total hours per semester	75
3.9 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1 Curriculum	
4.2 Competence	

5. Requirements (where appropriate)

5.1. For the course	Cluj-Napoca
5.2. For the applications	Cluj-Napoca

6. Specific competences

Professional competences	N/A
Transversal competences	N/A

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

7.1 General objectives	Developing the competences regarding the use, analysis and design of systems with microcontrollers
7.2 Specific objectives	1. Assimilation of theoretical knowledge regarding the simulation of electronic circuits with microcontrollers 2. Obtaining the skills to use the simulation programs of the electronic circuits with microcontrollers 3. Obtaining the skills to use the specific equipment of the electronic circuits with microcontrollers

8. Contents

8.1 Lecture (syllabus)	Teaching methods	Notes
1. Introduction. Microprocessors and Microcontrollers	Presentation, heuristic conversation, exemplification, problems presentation, teaching exercise,	Use of .ppt presentation, projector, blackboard
2. 8051 Microcontroller Hardware • General description • Internal memory • Stack;		
3. Programming uC8051• Assambler •Assembly directives;		
4. uC8051 instruction set • Addressing modes • Data transfer instructions;		
5. Modular programming;		
6. Logical instructions • Logical operations at byte level • Logical operations at bit level • Arithmetic operations • Incrementing, Decrementing • Summation, extract, multiply, divide;		
7. Input/ Output Pins, Ports, and Circuits • Description;		
8. Timers and Counters • Functioning modes;		
9. Programming microcontrollers in C language;		
10. Serial port • Serial port interrupts • Operation modes of the serial port;		
11. Interrupts • Description • Types of interrupts • Interrupts control • Interrupts validation • Interrupts priority;		
12. Converters A/D, D/A • PWM Generators;		
13. Jump and call opcodes • Conditional and unconditional jumps•		

14. Jump and call opcodes • Conditional and unconditional jumps•		

Bibliography
1. D.Petreuş, G.Munteanu, Z.Juhos, N.Palaghiţă – Aplicaţii cu microcontrolere din familia 8051 – Editura Mediamira,Cluj-Napoca, 2005

On-line references:
2. www.intel.com
3. www.philips.com
4. www.microchip.com;

8.2 Laboratory	Teaching methods	Notes
1. Lab instrumentation • Introduction • Introduction to Keil uVision IDE	Applications (Simulation, Experimental Measurements), blackboard	Use of laboratory instrumentation, experimental and evaluation boards, computers, white/magnetic board
2. RAM memory testing		
3. Soft delay subroutine • Introduction to Proteus;		
4. Working with data tables;		
5. Modular programming;		
6. Logical an arithmetic operations;		
7. Ports;		
8. Hard delay subroutine;		
9. Keyboard types used in microcontroller systems • Subroutines used to command the keyboards;		
10. Serial port • Serial interface • Working principles;		
11. Interrupts;		
12. Displays used in microcontroller systems • Subroutines used to command the displays;		
13. External signals processing;		
14. Lab recovery		

Bibliography
1. D.Petreuş, G.Munteanu, Z.Juhos, N.Palaghiţă – Aplicaţii cu microcontrolere din familia 8051 – Editura Mediamira,Cluj-Napoca, 2005

On-line references:
2. www.intel.com
3. www.philips.com
4. www.microchip.com;;

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

> The acquired competences will be used in the following occupations, according to the COR (Classification of Occupations in Romania): Broadcasting engineer; Electronics engineer, transport engineer, telecommunications engineer; Image engineer; Sound engineer; Design electronics engineer; Design engineer of systems and computers; Broadcasting crew chief engineer; Broadcast Exchange Chief Engineer; Communications engineer; Security systems engineer; Sales Support Engineer; Developer of multimedia applications; Network operating engineer; Communications systems testing engineer; Project manager; Traffic engineer; Consultant for communications systems.

10. Evaluations

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Assessment methods
10.4 Course	The level of knowledge obtained	Summative evaluation written exam	Verification (V: 0…10 points);
10.5 Seminar/Laboratory	The level of acquired abilities	Continuous formative evaluation	L (0..10 points)
10.6 Minimum standard of performance			

Qualitative level:

Minimal knowledge:
- ✓ Knowledge of the basic operation of the studied microcontroller
- ✓ Knowledge of the basic peripherals of a microcontroller
- ✓ Knowledge of the basic programing languages to program microcontrollers (C and assembly)

Minimal competences:
- ✓ To be able to describe the functionality of the microcontroller studied
- ✓ To be able to write a simple program used in microcontroller applications

Quantitative level:
- ✓ Participation to all applications and laboratories
- ✓ The final exam and laboratory grades to be higher than 5
- ✓ The final grade is calculated as follows: M = 0.5E + 0.5L. Condition: E≥5 si L≥5

Date of filling in: 27.09.2021	Responsible	Title First Name SURNAME	Signature
	Course	Prof. Dorin PETREUS, Ph.D	
	Applications	Assist. Prof. Radu ETZ, Ph.D	

Date of approval in the Department of Communications 27.09.2021	Head of Communications Department Prof. Virgil DOBROTA, Ph.D.
Date of approval in the Council of Faculty of Electronics, Telecommunications and Information Technology 27.09.2021	Dean Prof. Gabriel OLTEAN, Ph.D.