SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Electronics, Telecommunications and Information Technology
1.3	Department	Communications
1.4	Field of study	Electronics and Telecommunications Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Telecommunications Technologies and Systems, Applied Electronics
1.7	Form of education	Full time
1.8	Subject code	TST-E39.00, EA-E39.00

2. Data about the subject

2.1	Subject name					Microprocessors Systems					
2.2	Subject area					Electronics and Telecommunications Engineering					
2.3	Course responsible/lecturer					Professor Eugen LUPU, PhD					
2.4	Teachers in charge of applications					Assoc. Prof. Professor Anca APATEAN, PhD					
2.5	Year of study	III	2.6	Semester	2	2.7	Assessment	Exam	2.8	Subject category	DID/DOB

3. Estimated total time

Year/ Sem.	Subject name	No. of weeks	Course [hours/ week]	Applications [hours/ week]			Course [hours/ semester]	Applications [hours/ semester]			Indiv. study	TOTAL	Credits
				S	L	P		S	L	P			
III/2	Microprocessors systems	14	2		2		28		28		74	130	5

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	40
Supplementary study in the library, online and in the field	-
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	28
Tutoring	3
Exams and tests	3
Other activities	

3.7	Total hours of individual study	74
3.8	Total hours per semester	130
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	Basics on computers and microprocessors, digital integrated circuits, Boolean algebra, digital integrated circuit design, synthesis of logic functions
4.2	Competence	programming skills : x86 assembly language, C

5. Requirements (where appropriate)

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

6. Specific competences

Professional competences	C3. To apply knowledge, concepts and basic methods regarding computing systems' architecture, microprocessors, microcontrollers, programming languages and techniques C4. To design, implement and operate data, voice, video and multimedia services, based on the understanding and application of fundamental concepts from the field of communications and information transmission. C5. To select, install, configure and exploit fixed and mobile telecommunications equipment. To equip a site with common telecommunications networks.
Cross competences	N.A.

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

7.1	General objectives	Developing the competences regarding the use of microprocessors, microcontrollers and interfaces in microsystems and computers
7.2	Specific objectives	1. Understanding of main architectures in data processing 2. Understanding basic microprocessors concepts and programming using Intel x86 as reference 3. Interfaces, buses and programmable devices study and use 4. To assess the requirements of a microprocessor / microcontroller for a specific application 5. To develop applications using PC resources

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Course description. Evaluation mode. Pentium Processors. Architecture. Registers. Pipeline. Cache memory. Floating Point Unit. Branch prediction. New generation of Pentium. Multicore architectures.	Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation	Use of .pptx presentation, projector, blackboard
2	The 80x86 programmable interfaces family. Presentation of the timer I8254. Architecture. Pins and signals. The timer programming. Employment of the timer in the PC. Examples of use.		
3	Classification of interrupts. PIC I8259A circuit architecture. PIC pins and signals. Programming of the PIC. Interrupts assignment in PC.		
4	Direct memory access basics. The DMA controller I8237A.The internal architecture. Pins and signals. I8237A programming.		
5	PPI-8255A. The internal architecture. Pins and signals at 8255. Programming and applications.		
6	Serial Communications RS/EIA 232. UART/USART. The I8250/16550 devices architecture. Programming. Applications.		
7	Serial interfaces. I2C, SPI. Use and applications.		
8	PC parallel port. Parallel port signals. Extensions of the parallel port. Ports: Bidirectional, ECP. EPP. Applications.		
9	PC memory. The memory map (main memory, video, UMA, HMA). Memory extended and expanded. Virtual memory. Connecting additional memory to the PC memory.		
10	Memory Hierarchy in terms of technology. The cache role. The basic models of the cache. Cache Memory Architectures. The Pentium cache.		
11	Buses in the PC (ISA, PCI, AGP). ISA bus signals. Development of the ISA bus compliant cards.		
12	PCI Bus overview. Architecture and signals. Transfer modes. PCI express.		
13	USB Bus overview. USB On the Go. USB 3.0.		
14	Review-exam topics.		
8.2. Applications (lab)		Teaching methods	Notes
1	Introduction. Laboratory protection. Laboratory Objectives topic.	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, experimental boards, computers, magnetic board
2	Identifying processors in PCs. Microprocessors resources determination employing CPUID instruction.		
3	The timer circuit 8253/54. Applications. Generating audio signals.		
4	Programmable Interrupt Controller -I8259A. Applications.		
5	8237A DMA controller. Presentation and programming. DMA data transfer to PC in the video memory.		
6	Design cards on the ISA bus. Application - Signal Generator. 80x86.Extensie memory systems with memory. Design.		
7	The parallel port in PC computers. Application: interface a LCD to the parallel port.		
8	IEEE1284 parallel port in standard / 94. Applications EPP / ECP.		
9	The UART 16650 device. Serial communications applications.		
10	The memory in the PC. Additional memory connected to the UMA.		
11	The Cache memory. Application using CPUID instruction.		
12	USB Bus. Design USB devices using USB-serial converters FT232.		
13	Application of the FT245 parallel – USB converter.		
14	Lab. recovery and finalization of laboratory activity		

References

1. 1. Lupu, E. , Mesaroş, A., Suciu, A.F. MICROPROCESSORS Architectures and Applications Ed. RISOPRINT Cluj-Napoca 2002, ISBN 973-656-392-8
2. Lupu, E. SISTEME CU MICROPROCESOARE. Resurse hardware. Prezentare, programare şi aplicaţii. Ed. Albastră Cluj Napoca 2004, ISBN 973-650-109-4
3. 3. Tischer M., Jennerich B. *"LA BIBLE PC" PROGRAMMATION SYSTEME.* MICRO Application 1997
4. Buchanan, W. *PC interfacing,Communications and Windows Programing* Addison Wesley 1999
5. N. Mathivanan Microprocessors, PC Hardware and Interfacing PHI Learning Pvt. Ltd., 2003 ISBN 8120323173
6. *www.pcguide.com, www.intel.com*
7. [***] *Microprocessors Reference Manual*, Intel Corporation, 2004, www.intel.com

Slides : http://users.utcluj.ro/~elupu/Curs/

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

Competences acquired will be used in the following COR occupations (Electronics Engineer; Telecommunications Engineer; Electronics Design Engineer; System and Computer Design Engineer; Communications Design Engineer) or in the new occupations proposed to be included in COR (Sale Support Engineer; Multimedia Applications Developer; Network Engineer; Communications Systems Test Engineer; Project Manager; Traffic Engineer; Communications Systems Consultant).

9. Evaluations

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		The level of acquired theoretical knowledge and practical skills		- Summative evaluation written exam (theory and problems)		- Ex= T + P max 10 pts 65%
Applications		The level of acquired abilities		- 4-5 lab. tests		- Lab max. 10 pts. 35%
10.4 Minimum standard of performance						
Lab ≥ 4.5 and Ex ≥ 4.5 and 0.65Ex+0.35Lab ≥ 4.5 Remark. Lecture attendance allow to roundup the final grade.						

Date of filling in	Course responsible	Teachers in charge of applications
01.10.2018	Professor Eugen LUPU, PhD	Assoc. Professor Anca APATEAN, PhD