SYLLABUS

Discipline name	Microprocessors Systems
Profile	Electronics and Telecommunications Engineering
Specialization	Telecommunications Technologies and Systems
Code	51323909
Course leader	Professor Eugen LUPU, Ph.D. - Eugen.Lupu@com.utcluj.ro
Collaborators	Assistant Simina EMERICH - Simina.Emerich@com.utcluj.ro Assistant Anca APATEAN - Anca.Apatean@com.utcluj.ro
Department	Communications
Faculty	Electronics, Telecommunications and Information Technology

Sem.	Type of discipline	Course	Applications			Course	Applications			Ind. study	TOTAL	Credits	Form of assessment
		[hours/week]				[hours/semester]							
			S	L	P		S	L	P				
6	**Engineering**	**2**	**-**	**2**	**-**	**28**	**-**	**28**	**-**	**94**	**150**	**5**	**Exam**

Acquired competences :
Acquired skills (what the student is able to do):
• To know the basic processing architectures, to design systems and interfaces with microprocessors • To evaluate microprocessor architectures • To know the Pentium processor architecture and PC Programmable interfaces • To know the buses and common interfaces used in PC • To evaluate the processor / microcontroller needs for a specific application
Acquired abilities (what type of equipment/ instruments/ software the student is able to handle):
After going through the course students will be able: • to employ the interfaces used in PC • to use the PC to control various processes • to develop applications using PC resources (buses, interfaces)

Prerequisites (if necessary):
Knowledge about : Digital circuits, Assembly and C language programming, Conversion Systems and data acquisition

A. Course/Lecture (course/lecture titles)	
1	Pentium Processors. Architecture. Pipeline. Cache Memory. Floating Point Unit. Branch Prediction.
2	Programmable Circuits Family 80x86. The Timer Circuit I8254. Internal Architecture. Pins and Signals. The Timer Programming. The use of Timer Channels in PC. Applications.
3	Interrupts classification. The Programmable Interrupt Controller Circuit I8259A. Architecture. Pins and Signals. Programming. The use of PIC in PC.
4	The Direct Memory Acces Controller I8237 A. DMA transfer principle. Internal Architecture. Pins. Signals. The DMA Programming. DMA in PC.
5	The PIO Circuit- 8255A. Internal Architecture. Pins and Signals. Programming and Applications.
6	Serial Communications. PC UART's. RS/EIA 232 Interface. UART I8250/16550 Architecture. Programming. BIOS Services for Serial Port (INT 14h). Applications.
7	Serial Interfaces - I2C, SPI. Typical Use. Applications.
8	Standard Parallel Port (SPP) to IBM-PC. Signals. BIOS Services (INT 17h).
9	Extensions of the Parallel Port: bidirectional, ECP. EPP.
10	On the Memory in PC Systems. Memory Map (the base memory, video, UMA, HMA). Expanded and Extended Memory. Virtual Memory. Connecting memories to microprocessors systems.
11	Cache Memory. Basic model of the Cache. Architectures of the Cache. The Pentium processors Cache Memory.
12	Buses in PC (ISA,PCI). Buses Parameters. The ISA Bus signals. Designing an ISA-bus compliant board. The ISA Bus employment at Pentium processors.
13	PCI Bus. General presentation. Architecture. Transfer Modes.
14	USB Bus. General presentation. USB On the Go. Final Review.

B1. Applications – Laboratory (list of laboratories)	
1	Introduction- Laboratory Goals - Topics.
2	PC Processors Identification. Application – processor features detection by using CPUID instruction.

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3	The Timer Circuit I8253/54. Applications - audio signals generation.
4	The Programmable Interrupt Controller Circuit – I8259A
5	Interrupt System Applications
6	The DMA Controller 8237A.
7	Data transfer into the video memory from an input port, through DMA.
8	Designing the ISA-Bus Compliant Boards. Application – Signal generator.
9	The Memory in 80x86 Systems. Memory extension. Design.
10	Standard Parallel Port (SPP) to IBM-PC. Application – LCD interfacing to the parallel port.
11	The Parallel Port in the IEEE1284/94 Standard. Application EPP/ECP.
12	Cache Memory. Application.
13	USB Bus. Designing USB devices by using USB-serial converters FT 232.
14	Final Laboratory Evaluation.

C. Individual study (reference study contents, synthesis materials, projects, applications etc.)						
2 synthesis reports + 2 Home works applications						
Individual study structure	Course study	Problem solving, laboratory, home works	Applications preparation	Examination time	Additional reference study	Total no. of individual study hours
Hours	28	6	18	3	9	64

References (Textbooks, courses, laboratory manual, exercise book)

1. Lupu, E. , Mesaroş, A. , Suciu, A.F. MICROPROCESSORS - Architectures and Applications Ed RISOPRINT 2002
2. Tischer M., Jennerich B. *"LA BIBLE PC" PROGRAMMATION SYSTEME VI*^{eme} Edition Ed. Micro Applications 1997
3. Buchanan, W. *PC interfacing, Communications and Windows Programming* Addison Wesley 1999
4. N. Mathivanan Microprocessors, PC Hardware and Interfacing Prentice-Hall of India 2007

On-line references

Eugen Lupu http://users.utcluj.ro/~elupu/ro_Cursuri.htm

Final evaluation	
Evaluation method	Written exam (E): problem solving (50%) and theoretical subjects (50%). (2,5 h).
Mark components	Exam (E); Laboratory (L); Final Mark (N);
Mark computation	N=0,7E+0,3L; N≥5; L≥4.5; E≥4.5

Course leader,

Professor Eugen LUPU Ph. D.