SYLLABUS

Discipline name	Microprocessors
Profile	Electronics and Telecommunications Engineering
Specialization	Telecommunications Technologies and Systems
Code	51323309
Course leader	Professor Mircea Giurgiu, Ph.D – Mircea.Giurgiu@com.utcluj.ro
Collaborators	-
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				
5	**Engineering**	**2**	**-**	**2**	**-**	**28**	**-**	**28**	**-**	**94**	**150**	**5**	**Exam**

Acquired competences :

Acquired skills (what the student is able to do):

- to classify the microprocessors and to present important concepts such as: pipeline, Harvard architecture, MMXT, SIMD, SSE 2/3, HT and NetBurst
- to apply various addressing modes of memory and peripheral devices
- to give solutions for applications that require the use of interrupt system
- to use BIOS and DOS services for implementation of programs in assembling language
- to know to interconnect a microprocessor with the memory and peripheral devices
- to design and to program in assembling language applications involving data acquisition and communication protocols between various systems

Acquired abilities (what type of equipment/ instruments/ software the student is able to handle):

- to use the dedicated software tools for developing programs in assembling language (TASM, TLINK, etc)
- to be able to organize the programs in functional modules
- to be able to develop applications involving the use of interrupt system
- to be able to select the appropriate circuits for designing the memory blocks, I/O devices and to test them.

Prerequisites (if necessary):

Basics of computers, digital integrated circuits: Boolean algebra, synthesis of logic functions, automata, designing with digital integrated circuits.

A. Course/Lecture (course/lecture titles)	
1	Basics of microprocessors: von Neumann model, Harvard model, pipelining, features of microprocessors.
2	IA-32 Intel architecture and internal architecture of the I80x86 microprocessors.
3	Addressing of memory in real mode. Addressing in protected mode.
4	Data transfer and arithmetic instructions. Applications.
5	Logical instructions and instructions for control flow.
6	Instructions on strings of bytes and for I/O devices.
7	Procedures and macros. Development of programs in assembling language.
8	The interrupt system: the structure of IVT, HW and SW interrupts, changing the IVT, examples.
9	BIOS & DOS services. TSR programs. Examples: keyboard, videoscreen, HDD, serial and paralel interface.
10	Description of the signals for I80x86 and interfacing with external hardware.
11	Basic bus operations. Connection of the microprocessor in the system..
12	Principles in designing pluged-in/external I/O hardware interfaces. Designing of the memory blocks.
13	80x87 FPU. Functional description, hardware system interface, instruction set.
14	High speed communication interfaces: SCSI, USB, I2C. (the architecture, signals, examples of applications)

B. Applications – **Laboratory** (list of laboratories), **Seminar** (contents), **Project** (project contents)	
1	Presentation of the laboratory and computing facilities.
2	Representation of information in microcomputers. Problems.
3	Hands-on microprocessor simulator. Traffic lights controller and other simple applications.
4	Addressing modes and internal architecture of 80x86. Hands-on Turbo-debugger.
5	Applications with instructions set (I). Data transfer and arithmetic instructions.
6	Applications with instructions set (II). Logic instructions and instructions for control flow

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7	Applications with instructions on strings of bytes. Procedures and macros
8	Laboratory test. First evaluation.
9	Development of programs in assembling language. Using INT 10h.
10	Applications using Program Status Prefix (PSP)
11	The keyboard programming: installing own interrupt routine. The use of INT 16h. Applications.
12	Generation of sound signals using 8253.
13	Programming the 80x86 FPU
14	Synthesis problems and final test.

C. Individual study (reference study contents, synthesis materials, projects, applications etc.)

Reports with the results obtained in the laboratory, solve the problems on programming in assembling language, self-documentation, team-working for miniprojects.

Individual study structure	Course study	Problem solving, laboratory, project	Applications preparation	Examination time	Additional reference study	Total no. of individual study hours
Hours	32	24	18	3	17	94

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

UTC-N Library:

1. Serge Liddin – *Inside Microsoft .NET Assembler*, Redmond - Washinghton, 2003.
2. ***, *Microprocessors Reference Manual*, Intel Corporation, 2004
3. V. Lungu - *Procesoare Intel. Programare in limbaj de asamblare*, Ed. Teora, 2000
4. *** (Intel) – *Microprocessors. Vol1 and Vol 2*, Santa Clara, 1993
5. Adi Khambata – *Microprocessors/microcomputers architecture, software and systems*, New York, 1982
6. Allen Wyatt – *Advanced assembly language*,New Jersey, 1993.
7. Gh. Musca, *Programarea in limbaj de asamblare*, Ed. Teora, Bucuresti, 1998
8. I. Athanasiu, *Microprocesoarele 8086, 80286, 80386*, Ed Teora, 1992
9. E.Lupu, A. Mesaros, *Microprocessors. Architectures and applications*, Ed. Risoprint Cluj-Napoca, 2003
10. G. Toderean, *Limbajul de asamblare x86. Probleme*, Ed. Risoprint, 2003
11. V. Dobrota, s.a, *Aplicatii in sisteme cu microprocesoare din familia I80x86*, Ed. Terra, 1992
12. C. Strugaru, *Microprocesoare pe 16 biti*, Ed. TM Timisoara, 1992
13. T. Walter, S. Avtar, *Microprocesorul 8086*, Ed. TM Timisoara, 1992
14. G. Toderean, s.a, *Indrumator de laborator la microprocesoare. Vol. I si II*, Ed. UTCN, 1992/1993

Online materials:

15. www.pcguide.com

16. Internet resources in the area of microprocessors.

Other libraries (or in the lab):

1. – Microprocessor handbook.

Final evaluation	
Evaluation method	Partial examination (PE) grid after course #7 . Final examination (FE). Laboratory tests and activity in the lab (LB). Report in the form of a miniproject (MP).
Mark components	Final Exam (0…4.5), Partial exam (0…1.5), Report (0…1.5), Laboratory activity(0..2.5).
Mark computation	M = LB + MP + PE + FE.

Course leader,

Professor Mircea GIURGIU, Ph.D.

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