Syllabus

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Automation and Computer Science
1.3 Departament	Automation
1.4 Field of study	Systems Engineering
1.5 Cycle of study	Bachelor of Science
1.6 Program of study/Qualification	Automation and Applied Informatics (English)
1.7 Form of education	Full time
1.8 Subject code	29.00

2. Data about the subject

2.1 Subject name	Microprocessor-Based Systems				
2.2 Course responsible/lecturer	S.L.. dr. ing. Madalin Neagu madalin.neagu@aut.utcluj.ro				
2.3 Teachers in charge of applications	Conf. ing. Anca Hangan – nca.hangan@cs.utcluj.ro S.L.. dr. ing. Madalin Neagu madalin.neagu@aut.utcluj.ro As. Dr. eng. Stancovici Andrei Andrei.Stancovici@cs.utcluj.ro				
2.4 Year of study	2	2.5 Semester	2	2.6 Assessment *(E/C/V)*	E
2.7 Type of subject	*DF – fundamental, DD – in the field, DS – specialty, DC – complementary*				DD
	DI – compulsory, DO – elective, Dfac – optional				DI

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminar		Laboratory	2	Project	
3.2 Number of hours per semester	56	of which:	course	28	Seminar		Laboratory	28	Project	
3.3 Individual study										
(a) Manual, lecture material and notes, bibliography										33
(b) Supplementary study in the library, online and in the field										10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										28
(d) Tutoring										0
(e) Exams and tests										3
(f) Other activities:										0
3.4 Total hours of individual study (sum of (3.3(a)…3.3(f)))	74									
3.5 Total hours per semester (3.2+3.4)	130									
3.6 Number of credit points	5									

4. Pre-requisites (where appropriate)

4.1 Curriculum	Analog and digital Circuites
4.2 Competence	Programming

5. Requirements (where appropriate)

5.1. For the course	Video projector and black/white board
5.2. For the applications	Presence is mandatory

6. Specific competences

6.1 Professional competences	C2 Operation with fundamental concepts in computer science, information and communications technology C4 Design, implementation, testing, and maintenance of computer systems computer networks, and dedicated microprocessor systems
6.2 Cross competences	-

7. Course objectives

7.1 General objective	To familiarize the students with the basic concepts related to computer architectures, microprocessors, memories and other computer components;
7.2 Specific objectives	To assimilate and practice designing methods for microcomputers and micro-

	systems

8. Contents

8.1 Lecture	No.hours	Teaching methods	Notes
C1. Introduction - Brief History of computer science, evolution of microprocessors, the performance parameters of computer systems	2	Oral presentations from slides, examples on blackboard	
C2. The overall structure of a computer - the central processing unit, Arithmetical and Logical Unit	2		
C3. Computer design - design phases, design a simple calculator, a computer-type structure pipeline, hazard situations	2		
C4. Microprocessors - Definition, diagram of a system based on microprocessor microprocessor's signals, Intel x86 family of processors, superscalar P6 architecture, NetBurst architecture	2		
C5. Specialized microprocessors - digital signal processors, microcontrollers	2		
C6. Memory Design - ROM memory circuits, RAM, DRAM, operating principles, design methodology of memory modules	2		
C7. Memory hierarchies – cache memory, examples of implementation, virtual memory, memory segmentation, memory paging	2		
C8. Input / output Interface design - design principles, structure of interfaces, modes of transfer, transfer the program, system interruption	2		
C9. Input/Output Interface design (cont.) - transfer through direct memory access, transfer with input / output processor,	2		
C10. Input/Output Interface design (cont.) - Serial interfaces, Synchronous and asynchronous serial transfer, RS232 protocol specification, protocol 485, the message-based serial transfer	2		
C11. Input / output Interface design (cont.) - USB interface, parallel interface, an interface design example	2		
C12. Computer Networks - The ISO-OSI protocol levels, types of communication networks, detailed description of ISO-OSI protocol levels	2		
C13. Distributed control systems - definition, principles of distributed systems' implementation, Implementation of distributed control systems	2		
14. Advanced computing architectures – RISC architectures, Parallel Architectures	2		

Bibliography

1. D. Gorgan, G. Sebestyen, Structura sistemelor de calcul", Editura albastra, 2000,
2. D. Gorgan, G. Sebestyen, Proiectarea calculatoarelor", Editura albastra, 2005,
3. Gheorghe Sebestyen, Informatica industriala, Editura Albastra, 2006
4. S. Nedevschi, "Microprocesoare", Editura UTCN, 1994
5. Course slides at: http://users.utcluj.ro/~sebestyen/cursuri_lab.htm

8.2 Aplications (seminar/laboratory/project)	No.hours	Teaching methods	Notes
L1. The structure of a personal computer	2	Solving exercises and implementing small projects	
L2. ISA x86 architecture	2		
L3. Intel x86 processor family instruction set	2		
L4. Intel x86 processor family instruction set (Part IIa)	2		
L5. Addressing modes	2		
L6. Programming techniques in assembly language	2		
L7. Design of memory modules	2		
L8. Design of input / output interfaces, data transfer programs	2		
L9. Studying the sensory, computing and communication facilities of an Arduino type board	2		
L10. Studying the sensory, computing and communication	2		

facilities of an Arduino type board			
L11. Internet access to simple objects or devices	2		
L12. Control of complex processes through an Arduino platform - Part I	2		
L13. Control of complex processes through an Arduino platform - Part II	2		
L14. Examination	2		

Bibliography

1. G. Sebestyen, A. Hangan s.a., Sisteme cu microprocesoare-Lucrari de laborator, http://users.utcluj.ro/~sebestyen/cursuri_lab.htm
2. http://users.utcluj.ro/~ancapop/sm.htm

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

The courses and applications are based upon the most recent processors, memories and other digital devices, which are used in the ICT community. The curriculum was established in accordance with the requirements and expectations coming from industry.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Understanding of concepts and principles, design capabilities	Written exam	0.7
Seminar			
Laboratory	Design and implementation skills	Colloquy - Written	0.3
Project			

Minimum standard of performance:
Minimum grade 5 for written exam, attendance to every application hours

Date of filling in:		Title Firstname NAME	Signature
3.02.2025	Course	S.L. dr. ing.Madalin Neagu	
	Aplications	S.L. dr. ing.Madalin Neagu As. Dr. ing. Andrei Stancovici	

Date of approval by the Department Board ……. _____	Head of Departament ..... Prof.dr.ing. Honoriu VĂLEAN
Date of approval by the Faculty Council …… _____	Dean Prof.dr.ing. Vlad Muresan