SYLLABUS

1. Data about the program of study

1.1 Institution	The Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Automation and Computer Science
1.3 Department	Computer Science
1.4 Field of study	Computer Science and Information Technology
1.5 Cycle of study	Bachelor of Science
1.6 Program of study/Qualification	Computer science/ Engineer
1.7 Form of education	Full time
1.8 Subject code	9.

2. Data about the subject

2.1 Subject name	***Assembly Language Programming***				
2.2 Course responsible/lecturer	Assoc. Prof. dr. eng. Emil Cebuc- Emil.Cebuc@cs.utcluj.ro				
2.3 Teachers in charge of seminars/ laboratory/ project	Assoc. Prof. dr. eng. Emil Cebuc- Emil.Cebuc@cs.utcluj.ro S.l. Dr. Ing. Dragos Lisman - dragos.lisman@cs.utcluj.ro Ing. Bogdan Laslo - bogdan.laslo@emerson.com				
2.4 Year of study	I	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars		Laboratory	2	Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars		Laboratory	28	Project	

3.3 Individual study:	
(a) Manual, lecture material and notes, bibliography	10
(b) Supplementary study in the library, online and in the field	17
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	10
(d) Tutoring	4
(e) Exams and tests	3
(f) Other activities:	0

3.4 Total hours of individual study (suma (3.3(a)...3.3(f)))	44
3.5 Total hours per semester (3.2+3.4)	100
3.6 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	None
4.2 Competence	None

5. Requirements (where appropriate)

5.1. For the course	Projector, Blackboard
5.2. For the applications	PC with 32 bit operating system , 1 PC per student, DOSBox

6. Specific competence

6.1 Professional competences	**C2** Designing hardware, software and communication components (2 credits) **C2.1** Describing the structure and functioning of computational, communication and software components and systems **C2.2** Explaining the role, interaction and functioning of hardware, software and communication components **C2.3** Building the hardware and software components of some computing systems using algorithms, design methods, protocols, languages, data

	structures, and technologies **C2.4** Evaluating the functional and non-functional characteristics of the computing systems using specific metrics **C2.5** Implementing hardware, software and communication systems
6.2 Cross competences	N/A

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

7.1 General objective	Knowledge of Microprocessor structure and low level programming
7.2 Specific objectives	Is able to use various addressing modes, assembly language programming techniques, use specific programming tools

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
C1. Introduction, data representation	2	PowerPoint presentations, Examples of Program listings, lecture	
C2. ISAx86 Architecture, addressing modes	2		
C3. x86 Instruction format	2		
C4. MASM x86 directives ALP program prototypes	2		
C5. ISA x86 Instruction set – data transfer, address transfer arithmetic and logical instructions	2		
C6. ISA x86 Instruction set – shift, rotate, flow control instructions	2		
C7. ISA x86 Instruction set – 386, software interrupt, string instructions	2		
C8. Coprocessor structure and operation, data transfer, arithmetic instructions	2		
C9. Coprocessor math functions, misc. instructions	2		
C10. MMX extensions – MMX calculus, MMX instructions	2		
C11. Protected mode operations, memory management, segmentation, privilege levels	2		
C12. System function calls	2		
C13. Multiple module programs	2		
C14. Program optimisation	2		

Bibliography

1. PPT lecture notes at: ftp.utcluj.ro/pub/users/cemil /ALP
2. D. Gorgan, G. Sebestyen, Proiectarea calculatoarelor", Editura albastra, 2005,
3. R. Hyde R. Hyde, "AoA - The Art of Assembly language", la adresa: webster.cs.ucr.edu/AoA/DOS/pdf/
4. S. Nedevschi, "Microprocesoare", Editura UTCN, 1994

8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
L1. Information Representation	2	Interactive tutoring, learn bye example	
L2. Tools, ISA x86 Architecture, addressing modes	2		
L3. Addressing Modes and address calculus	2		
L4. Pseudo instruction Usage	2		
L5. ISA x86: Instructions data transfer , arithmetical and logical	2		
L6. ISA x86: Instructions: shift and rotate	2		
L7. ISA x86: Instructions: flow control, other instructions	2		
L8. Real number	2		
L9. Complex operations	2		
L10. Multimedia operations	2		
L11. Program optimisation	2		
L12. System function call	2		
L13. Advanced programming techniques	2		
L14. Colloquium	2		

Bibliography

Art of assembly language, Randall Hyde available at: ftp://ftp.utcluj.ro/pub/users/cemil/asm/
Lab Workbook, Emil Cebuc et. All. Available at: ftp://ftp.utcluj.ro/pub/users/cemil/asm/labs/

**Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.*

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

Course and lab contents are discussed and compared to similar courses in other universities and with software companies like Bitdefender

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Knows microprocessor structure, number representation, x86 basic instruction set, system function calls and assembly program structure	Final Oral exam over videoconference Admittance to final exam conditioned by successful lab colloquium	2/3
Seminar			
Laboratory	Is able to develop a medium size program using specific tools	Lab Colloquium online moodle	1/3
Project			

Minimum standard of performance:
Is able to develop a medium size interactive assembly language program using specific tools
Grade calculus: 22% midterm +33 % lab + 45% final exam
Conditions for participating in the Lab Colloquium: ALL lab works have been attended and fulfilled
Conditions for participating in the final exam: Lab Colloquium ≥ 5
Conditions for promotion: final exam ≥ 5
TOP 10% in midterm evaluation students are eligible to opt for a project instead of final examination

Date of filling in:	**Titulari**	**Titlu Prenume NUME**	**Semnătura**
	Course	Assoc.prof.dr.eng. Emil Cebuc	
	Applications	Assoc.prof.dr.eng. Emil Cebuc	
		S.l. Dr. Ing. Dragos Lisman	
		Ing. Bogdan Laslo	

Date of approval in the department	Head of department Prof.dr.ing. Rodica Potolea
Date of approval in the Faculty Council	Dean Prof.dr.ing. Liviu Miclea