

SYLLABUS / FIȘA DISCIPLINEI
1. Information on the study programme / Date despre programul de studii

1.1. Institution / Instituția de învățământ superior	Universitatea de Vest din Timișoara
1.2. Faculty / Facultatea	Matematică și Informatică
1.3. Department / Departamentul	Computer Science (Informatică)
1.4. Study program field	Computer Science (Informatică)
1.5. Study cycle/ Ciclul de studii	Bachelor / licență
1.6. Study programme / Programul de studii / calificarea*	Computer Science / Informatică in limba engleză

2. Information on the course / Date despre disciplină

2.1. Title of the course / Denumirea disciplinei		Computer Architecture					
2.2. Teacher in charge of the course / Titularul activităților de curs		Conf. Dr Adrian Crăciun					
2.3. Teacher in charge of the seminar / Titularul activităților de seminar		Dr. Silviu Panica					
2.4. Study year / Anul de studii	1	2.5. Semester / Semestrul	1	2.6. Examination type / Tipul de evaluare: E(xam)/C(olloquim)	C	2.7. Course type / Regimul disciplinei: M(andatory)/ E(lective)/ F(acultative)	M

3. Estimated study time (number of hours per semester) /Timpul total estimat (ore pe semestru al activităților didactice)

3.1. Attendance hours per week / Număr de ore pe săptămână	3	out of which din care: 3.2 lecture/ curs	2	3.3. seminar/laborator	1
3.4. Attendance hours per semester / Total ore din planul de învățământ	42	out of which: 3.5 lecture / curs	28	3.6. seminar/laborator	14
Distribution of the allocated amount of time / Distribuția fondului de timp*					hours/ ore
Individual study /Studiu după manual, suport de curs, bibliografie și notițe					39
Supplementary documentation at library or using electronic repositories / Documentare suplimentară in bibliotecă, pe platformele electronice de specialitate					0
Preparing for laboratories, homework, reports etc. /Pregătire seminarii/laboratoare, teme, referate, portofolii și eseuri					20
Exams / Examinări					3
Tutoring / Tutorat					11
3.7. Total number of hours of individual study / Total ore studiu individual	73				
3.8. Total number of hours per semester / Total ore pe semestru	115				

3.9. Number of credits (ECTS) /5	
Număr de credite	

4. Prerequisites (if it is the case) / Precondiții (acolo unde e cazul)

4.1. curriculum / de curriculum	Basic number theory (high-school level)
4.2. skills / de competențe	-

5. Requirements (if it is the case) / Condiții (acolo unde e cazul)

5.1. for the lecture / de desfășurare a cursului	Whiteboard, projector.
5.2. for the seminar, laboratory / de desfășurare a seminarului/laboratorului	Whiteboard, computers with internet access.

6. Acquired skills / Competențe specifice acumulate

Professional skills / Competențe profesionale	<ul style="list-style-type: none"> • Cognitive: understand the design, organization, functioning of computing devices, influence of technology on the development of computers, trends in the evolution of computers, the relation between computer architecture and programming the computer, types of architectures. • Technical: analyze, design and optimize electronic circuits (basic), understand, analyze and evaluate microarchitectures, understand and analyze optimizations for performance, understand ISA and their relations to microarchitectures, the role of operating systems in programming, data representations in computers, instruction execution. • Affective-cognitive: understanding the underlying mechanisms of how (computing) technology functions, developing the capacity to formulate and seek requirements in a technical setting, for solving (technical) problems.
Transversal skills / Competențe transversale	<ul style="list-style-type: none"> • Develop the capability to find technical information, evaluate information sources, analyze and present technical information, synthesize and apply technical knowledge, communicate this information.

7. Objectives of the course / Obiectivele disciplinei (reieșind din grila competențelor specifice acumulate)

7.1. General objective / Obiectivul general al disciplinei	An introductory presentation on the organization, design and functioning of computers: multilevel organization of computers, history and technological trends, basic components of computers, gates, circuits, microarchitecture, architecture, operating systems, assembly programming, data representation.
7.2. Specific objectives / Obiectivele specifice	<p>Knowledge:</p> <ul style="list-style-type: none"> - describe the levels of the multilevel machine, representations of numbers, typical techniques for optimization at different levels in the architecture. <p>Abilities:</p> <ul style="list-style-type: none"> - identify the characteristics of computer architectures and microarchitectures from technical documentation, apply the knowledge about architecture to better understand how to program a computer, represent and use computer numbers,

	implement transformation methods. Aptitudes: - analyze, present and argue the impact of computer architecture in the functioning and programming of
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8. Content / Conținuturi*

8.1. Lecture / Curs	Teaching strategies / Metode de predare	Remarks, details / Observații
L01- Introduction: Structured Computer Organization: Languages, virtual Machines. Levels of a modern machine.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L02 The evolution of multilevel machines.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L03 Generations of computers. Moore's law. Families of computers.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L04- Computer systems organization (1). CPU. Data path. RISC vs. CISC. Design principles for modern computers. Main memory.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L05-Computer systems organization (2). Secondary memory. Hard disk types. RAID. Optical disks. Buses and interfaces.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L06- Digital logic level. Gates and boolean algebras. Combinatorial circuits. Memories. Memory organization.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L07-Digital logic level (2). CPU chips. Buses. Example chips: Intel UltraSPARC, picoJava II.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L08- Microarchitecture. Data	Q&A/Lecture/Dialogue	Lecture materials available at

path. Memory operations. Microinstructions. The Mic-1 microarchitecture. Integer JVM instructions. IJVM memory model.		http://web.into.uvt.ro/~acraciun
L09- Microarchitecture (2). IJVM in Mic-1. Execution. Design principle. Mic-2. Pipelining. Mic-3. Mic-4. Improving performance. Intel, UltraSPARC, picoJava II microarchitecture.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L10- Instruction set architecture level. Properties. Memory models. Registers. Examples: Intel, UltraSPARC, Java Virtual Machine. Data types. Instruction formats. Examples: Intel, UltraSPARC, Java Virtual Machine.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L11- Instruction set architecture level (2). Addressing. Instruction types. Examples: Intel, UltraSPARC, Java Virtual Machine. Coroutines. Procedures. Interrupts.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L12- Operating system level. Virtual memory. Paging. Segmentation. Virtual I/O instructions. Example OS: Windows NT, UNIX.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L13- Assembly level language. Pseudoinstructions. Macros. Assembly process. Linking and loading.	Q&A/Lecture/Dialogue	Lecture materials available at http://web.into.uvt.ro/~acraciun
L14- Exam	Written exam	
Recommended bibliography / Bibliografie		

<p>[East, 1990] Ian East, Computer Architecture and Organization, Pitman Publishing, London, 1990.</p> <p>[Harris, Harris, 2007] David Harris and Sarah Harris, Digital Design and Computer Architecture, Elsevier Inc., 2007.</p> <p>[Hennessy, Patterson, 2007] John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, Elsevier Inc., Fourth Edition, 2007.</p> <p>[Hsu, 2001] John Y. Hsu, Computer Architecture: Software Aspects, Coding, and Hardware, CRC Press Boca Raton, London, New York, Washington D.C., 2001.</p> <p>[Tanenbaum, 2005] Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall, 5th Edition, 2005.</p>		
8.2. Seminar, lab / Seminar, laborator	Teaching/learning strategies / Metode de predare/ învățare	Remarks, details / Observații
Lab01 – Positional representation of numbers, radix transformation	Q&A, dialogue, collaborative learning	
Lab02 – Representations of integers, arithmetic	Q&A, dialogue, collaborative learning	
Lab03 – Floating point representation	Q&A, dialogue, collaborative learning	
Lab04 – Design and analysis of digital circuits (1)	Q&A, dialogue, collaborative learning	
Lab05 – Mic-1 Microarchitecture (I)	Q&A, dialogue, collaborative learning	
Lab06 – Mic-1 Microarchitecture (II)	Q&A, dialogue, collaborative learning	
Lab07 – Architectures survey / Assembly demo	Q&A, dialogue, collaborative learning	
<p>Recommended bibliography / Bibliografie</p> <p>[Tanenbaum, 2005] Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall, 5th Edition, 2005.</p>		
<p>1.</p>		

9. Correlations between the content of the course and the requirements of the IT field / Coroborarea conținuturilor disciplinei cu așteptările reprezentanților comunității epistemice, asociațiilor profesionale și angajatorilor reprezentativi din domeniul aferent programului

The content of this lecture is consistent to those specified in standard computer science curricula (e.g. IEEE/ACM Computer science curriculum, well known universities' similar lectures). It provides information that is used and useful to the current industrial entities in the local IT industry.

10. Evaluation / Evaluare*

Activity / Tip de activitate	10.1. Evaluation criteria / Criterii de evaluare**	10.2. Evaluation methods / Metode de evaluare***	10.3. Weight in the averaged mark / Pondere din nota finală
10.4. Lecture / Curs	10: excellent (outstanding performance with only minor errors), 8-9: very good (above the average standard but with some errors), 6-7: satisfactory (fair, but with significant shortcomings), 5: sufficient (performance meets minimum criteria), 0-4: fail (significant work has to be done)	Written exam	80%
10.5. Seminar/ lab	Regular homework. Optional work available: implementations of methods discussed.		30% 20% for optional work.
10.6. Minimal knowledge for passing / Standard minim de performanță			
Basic knowledge of the concepts presented in the lecture: explain and apply. Minimal knowledge is measured by reaching the grade for passing the exam (5).			

Date/ Data completării
Oct. 2016

Signature (lecture) /
Semnătura titularului de curs

Signature (seminar)
Semnătura titularului de seminar

Signature (director of the department)
Semnătura directorului de departament
Conf.dr. Victoria Iordan