



## SYLLABUS

<b>Basic information of the course</b>	
<b>University:</b>	<b>University “Ukshin Hoti” - Prizren</b>
<b>Academic unit:</b>	<b>Faculty of Computer Science</b>
<b>Study program:</b>	<b>Information Technologies and Telecommunication</b>
<b>Course:</b>	<b>Computer Architecture and Operating Systems</b>
<b>Study level:</b>	<b>Bachelor</b>
<b>Course status:</b>	<b>Mandatory</b>
<b>Study year:</b>	<b>1</b>
<b>Number of hours per week:</b>	<b>2+2</b>
<b>Credit value - ECTS:</b>	<b>6</b>
<b>Time / location:</b>	<b>It will be published in the university web site!</b>
<b>Lecturers:</b>	<b>Assoc. Prof. Dr. Samedin Krrabaj Ass. Arbër Beshiri, Ph. D. c.</b>
<b>Contact details:</b>	<b>samedin.krrabaj@uni-prizren.com arber.beshiri@uni-prizren.com</b>
<b>Course description:</b>	<p>This course will provide students basic concepts of modern architecture and computer organization. The main purpose of the course is to introduce the students to the main components of the computer structure and their internal functioning. Familiarity with computer hardware and its interface - software, the interaction between them to provide users the core functions of the computer. The course will handle with the different formats of data representation on the computer, the different actions performed on this data, and the main I/O units involved in modifying it. Basic notions on memory organization and architecture, connections to system input and output, computer instructions, CPU structure and functions, and control unit operation will be given. Students through this course will also be introduced to modern operating systems and their functionality in general.</p>
<b>Course objectives:</b>	<p>The purpose of this course is to study deeply the basics and developments in the field of computer architecture and operating systems. While special</p>

	emphasis lies on basic knowledge in the implementation of the von Neumann computer architecture. Here we will study advanced techniques such as parallelism at the instruction level or threads, pipelining, dynamic scheduling used in modern processors, in order to achieve high performance. Particular attention will be given to the design of fast processors, rapid memory, multiprocessors, and differences in architectural features.		
<b>Learning outcomes:</b>	<p>The course has the main objectives of providing knowledge on architecture and the organization of computers. Then, providing general and applied knowledge on the development of information technology and computers in general, with the aim of implementing the acquired knowledge.</p> <p>The course purposes:</p> <ul style="list-style-type: none"> <li>- Students to encourage and work in a group and equipped with knowledge and general skills on developing core techniques around high performance computers.</li> <li>- Students to get knowledge in the field of architecture and organization of computers and operating systems.</li> </ul>		
<b>Contribution on student load (must correspond with learning outcomes)</b>			
<b>Activity</b>	<b>Hours</b>	<b>Days/week</b>	<b>Total/hours</b>
Lectures	2	15	30
Exercise theoretical/laboratory	2	15	30
Practice work	1	2	2
Contact with lecturer/consultations	1	5	5
Field exercises	1	1	1
Midterms	2	2	4
Laboratory exercises	2	2	4
Individual time spent studying (at the library or home)	3	10	30
Final preparation for the exam	5	6	30
Time spent in evaluation (tests, quiz, final exam)	2	3	6
Projects, presentations, etc.	4	2	8
<b>Total</b>			<b>150</b>
Notice: 1 ECTS credits = 25 hours commitment, e.g. if the course has 6 ECTS credits student must have 150 hours during the semester.			
<b>Teaching methods:</b>	The course is a combination of lectures, discussions,		

	numerical and laboratory exercises, while the assignments are presented by the laboratory course lecturers!	
<b>Assessment methods:</b>	<ul style="list-style-type: none"> <li>- Attendance in lectures and exercises: 5% + 5%</li> <li>- Semestral project/paper: 20%.</li> <li>- Midterm 1: 35%.</li> <li>- Midterm 2: 35%.</li> <li>- Or final exam: 100%.</li> </ul>	
<b>Assessment and grading:</b>	<b>Vlerësimi në %</b>	<b>Nota përfundimtare</b>
	91% - 100%	10
	81% - 90%	9
	71% - 80%	8
	61% - 70%	7
	51% - 60%	6
	0% - 50%	5
<b>Literature</b>		
<b>Basic literature:</b>	<ol style="list-style-type: none"> <li>1. William Stallings. Computer Organization and Architecture. Designing for Performance, 11<sup>th</sup> Edition, Pearson, 2019.</li> <li>2. Andrew Tanenbaum and Herbert Bos. Modern Operating Systems, 4<sup>th</sup> Edition, Pearson, 2015.</li> <li>3. Nderim Zeqiri, Sistemet Operative &amp; Shell Script Linux - Ushtrime, Arbëria Design, Tetovë, 2020.</li> <li>4. Daniel Ellard. MIPS Assembly Language Programming.</li> </ol>	
<b>Additional literature:</b>	<ol style="list-style-type: none"> <li>1. David Patterson and John Hennessy. Computer Organization and Design. The Hardware/Software Interface, 6<sup>th</sup> Edition, Elsevier, 2020.</li> <li>2. Agim Çami. Organizimi dhe Arkitektura e Kompjuterëve, Tiranë, 2012.</li> <li>3. Agim Çami. Arkitektura e Kompjuterëve, Tiranë, 2011.</li> </ol>	
<b>Study plan</b>		
<b>Week</b>	<b>Lectures</b>	
<i>First week:</i>	<ul style="list-style-type: none"> <li>• Introduction to course organization - syllabus (about lectures).</li> <li>• Introduction to computer architecture.</li> </ul>	
<i>Second week:</i>	<ul style="list-style-type: none"> <li>• Computer evolution and performance.</li> </ul>	

<i>Third week:</i>	<ul style="list-style-type: none"> <li>• A top-level view of computer function and interconnection.</li> </ul>
<i>Fourth week:</i>	<ul style="list-style-type: none"> <li>• Cache memory.</li> </ul>
<i>Fifth week:</i>	<ul style="list-style-type: none"> <li>• Internal memory.</li> </ul>
<i>Sixth week:</i>	<ul style="list-style-type: none"> <li>• External memory.</li> </ul>
<i>Seventh week:</i>	<ul style="list-style-type: none"> <li>• Input/ output computer modules.</li> </ul>
<i>Eighth week:</i>	<ul style="list-style-type: none"> <li>• First midterm.</li> </ul>
<i>Ninth week:</i>	<ul style="list-style-type: none"> <li>• Operating system support.</li> </ul>
<i>Tenth week:</i>	<ul style="list-style-type: none"> <li>• Computer arithmetic.</li> </ul>
<i>Eleventh week:</i>	<ul style="list-style-type: none"> <li>• Instruction sets: characteristics and functions.</li> <li>• Instruction sets: addressing modes and formats.</li> </ul>
<i>Twelfth week:</i>	<ul style="list-style-type: none"> <li>• Processor structure and function.</li> <li>• Instruction-level parallelism and superscalar processors.</li> </ul>
<i>Thirteenth week:</i>	<ul style="list-style-type: none"> <li>• Parallel processing.</li> <li>• Multicore computers.</li> </ul>
<i>Fourteenth week:</i>	<ul style="list-style-type: none"> <li>• Control unit operation.</li> <li>• Microprogrammed control.</li> </ul>
<i>Fifteenth week:</i>	<ul style="list-style-type: none"> <li>• Second (final) midterm.</li> </ul>

## Exercises

Study plan	
Java	Exercises
<i>First week:</i>	<ul style="list-style-type: none"> <li>• Introduction to course organization – syllabus (about exercises).</li> <li>• Knowledge of computer parts.</li> </ul>
<i>Second week:</i>	<ul style="list-style-type: none"> <li>• The process of formatting and installing of the operating system.</li> </ul>
<i>Third week:</i>	<ul style="list-style-type: none"> <li>• Numerical/laboratory exercises about the top-level view of computer function and interconnection.</li> </ul>
<i>Fourth week:</i>	<ul style="list-style-type: none"> <li>• Numerical/laboratory exercises about the cache memory.</li> </ul>
<i>Fifth week:</i>	<ul style="list-style-type: none"> <li>• Numerical/laboratory exercises about the internal memory.</li> </ul>
<i>Sixth week:</i>	<ul style="list-style-type: none"> <li>• Numerical/laboratory exercises about the external memory.</li> <li>• Laboratory exercises about basic commands of Linux.</li> </ul>
<i>Seventh week:</i>	<ul style="list-style-type: none"> <li>• Laboratory exercises about input/output computer modules.</li> <li>• Developing and testing programs in Shell Script – Linux.</li> </ul>
<i>Eighth week:</i>	<ul style="list-style-type: none"> <li>• Consultations about the midterm 1.</li> </ul>

<b><i>Ninth week:</i></b>	<ul style="list-style-type: none"> <li>• Operating systems security.</li> </ul>
<b><i>Tenth week:</i></b>	<ul style="list-style-type: none"> <li>• Laboratory exercises about computer arithmetic and assembler.</li> </ul>
<b><i>Eleventh week:</i></b>	<ul style="list-style-type: none"> <li>• Instruction Sets: characteristics and functions.</li> <li>• Instruction sets: addressing modes and formats.</li> <li>• Developing and testing programs in Shell Script – Linux.</li> </ul>
<b><i>Twelfth week:</i></b>	<ul style="list-style-type: none"> <li>• Processor structure and function.</li> <li>• Instruction-level parallelism and superscalar processors.</li> <li>• Developing and testing programs in Shell Script – Linux.</li> </ul>
<b><i>Thirteenth week:</i></b>	<ul style="list-style-type: none"> <li>• Parallel processing.</li> <li>• Multicore computers.</li> <li>• Developing and testing programs in Shell Script – Linux.</li> </ul>
<b><i>Fourteenth week:</i></b>	<ul style="list-style-type: none"> <li>• Control unit operation.</li> <li>• Microprogrammed control.</li> <li>• Developing and testing programs in Shell Script – Linux.</li> </ul>
<b><i>Fifteenth week:</i></b>	<ul style="list-style-type: none"> <li>• Consultation about the midterm 2.</li> </ul>

<b>Academic policies and rules of conduct</b>	
<ul style="list-style-type: none"> <li>• Generally lecture presentations will be made through MS PowerPoint, tables, material usage, computer programs and numeric exercises.</li> <li>• Additional resources (scientific papers, publications, national bulletins, as well as recent discoveries and research) will be provided by professors.</li> <li>• In the absence of the opportunity for practical work to be organized weekly, in cooperation with the management of the university, this activity will be organized on certain days in: organizations, companies, etc.</li> <li>• During each session will be organized the conversation and co-participation with the students!</li> <li>• Students are required to be regular in lectures and exercises!</li> <li>• It will be evaluated when the students collaborate and participate in the lectures and course exercises!</li> <li>• Timely arrival in lectures and exercises is mandatory!</li> </ul>	