SYLLABUS

1.1 Higher education	Babes-Bolyai University	
institution		
1.2 Faculty	Mathematics and Informatics	
1.3 Department	Informatics	
1.4 Field of study	Informatics	
1.5 Study cycle	Licence	
1.6 Study programme /	Informatics - english	
Qualification		

1. Information regarding the programme

2. Information regarding the discipline

2.1 Name of the discipline (en)	Operating systems			
(ro)	Sisteme de operare			
2.2 Course coordinator	Assoc. prof. Rares Boian			
2.3 Seminar coordinator	Assoc. prof. Rares Boian			
2.4. Year of study 1 2.5 Semeste	2 2.6. Type of E 2.7 Type of Mandatory			
	evaluation discipline			
2.8 Code of the MLE5007				
discipline				

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	5	Of which: 3.2 course	2	3.3	3
				seminar/laboratory	
3.4 Total hours in the curriculum 70		Of which: 3.5 course	28	3.6	42
				seminar/laboratory	
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					20
Additional documentation (in libraries, on electronic platforms, field documentation)					10
Preparation for seminars/labs, homework, papers, portfolios and essays					10
Tutorship				5	
Evaluations				10	
Other activities:					
3.7 Total individual study hours		55			
3.8 Total hours per semester		125			
3.9 Number of ECTS credits		5			

4. Prerequisites (if necessary)

4.1. curriculum	
4.2. competencies	

5. Conditions (if necessary)

5.1. for the course	•	The requirements posted here http://www.cs.ubbcluj.ro/~rares/course/os/
5.2. for the seminar /lab	•	Lab rooms with Windows and UNIX operating system access
activities	•	The requirements posted here http://www.cs.ubbcluj.ro/~rares/course/os/

6. Specific competencies acquired

of opecane con	ipetencies acquired
	\cdot Define notions, concepts, theories and models of basic operating systems.
Professional competencies	\cdot Critical analysis and use of the principles, methods and techniques work for quantitative and qualitative evaluation of the processes within an operating system and communication mechanisms between its processes
competencies	\cdot Apply basic concepts and theories in the field of computer architecture, programming methods and operating systems project development professional
	\cdot Ability to solve problems for low-level interface on OS kernels
Transversal competencies	\cdot Execution of the tasks required under specified requirements and the deadlines imposed, with the rules of professional ethics and moral conduct
	\cdot Information and permanent documentation in its field
	\cdot Seeking to improve business results by engaging in professional activities

7. Objectives of the discipline (outcome of the acquired competencies)

7. Objectives of the disciplin	e (buicome of me acquired competencies)
7.1 General objective of the	• Learning the main entities and concepts that operates in operating
discipline	systems: processes and files.
	• The base station processes the binding of files and communication
	between processes.
	• Learning programming bases specific operating systems: type scripting
	language programming (sh, bash, PowerShell) and use system functions
	in standard C language.
	• Presentation of the case studies, the enitatilor, concepts and APIs
	operating processes provided by the Unix family of operating systems
	(Solaris, Linux, BSD, etc)
7.2 Specific objective of the	• Unix operating system: introduction.
discipline	Programming Shell.
	Windows Introduction: bat file commands
	• Unix file system: tree structure and connections.
	Unix Operating System I / O, processes signals.
	Communication between Unix processes.
	Installation and configuration of operating systems

8. Content

8.1 Course	Teaching methods	Remarks
Week. 1 Unix: Introduction.	Interactive	
Unix commands and arguments.	exposure	
Regular Expression, generic specification of	• Explanation	
files.	Conversation	
Filters and text editors.	 Didactical 	
	demonstration	
Week. 2 Shell Programming.	Interactive	
Sh Processors.	exposure	
Variables, control structures (if, for, while, do,	Explanation	
case).	Conversation	
Embedded commands.		

Remarcable shell variables. - Didactical Week. 3. Windows: introduction. - Interactive Commands and arguments. - Explanation Files and paths; Access rights - Explanation Command bat files - Didactical Week. 4 OS Unix: processes. - Interactive Unix processes; structure, API (fork, wait, - Explanation exec, exit, system, popen). - Explanation Week. 5 POSIX Threads - Interactive Concepts. - Explanation API: create, exit, join. - Explanation Mutex variables. - Explanation Week. 6 Unix File System; I/O operations. - Interactive Hard and symbolic links. - Explanation Mounting. - Explanation File access rights - Interactive open, close, read, write, lseek, file lock. - Didactical demonstration - Didactical
Week. 3. Windows: introduction. Commands and arguments. Files and paths; Access rights Command bat files- Interactive exposure - Explanation - Didactical demonstrationWeek. 4 OS Unix: processes. Unix processes; structure, API (fork, wait, exec, exit, system, popen) Interactive exposure - Explanation - Conversation - Didactical demonstrationWeek. 5 POSIX Threads Concepts. API: create, exit, join. Mutex variables Interactive exposure - Explanation - Conversation - Didactical demonstrationWeek. 6 Unix File System; I/O operations. Hard and symbolic links. Mounting. File access rights open, close, read, write, Iseek, file lock Interactive exposure - Explanation - Conversation - Didactical demonstrationWeek. 7 General Theory of Operating Systems Classifications. Functions Architectures Interactive exposure - Explanation - Conversation - Didactical demonstrationWeek. 8 Processes Interactive exposureWeek 8 Processes Interactive exposure
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demonstration Week. 8 Processes. · Interactive
Week. 8 Processes. · Interactive
Concepts exposure
Concurrence. · Explanation
Semaphores. · Conversation
Critical sections and race conditions · Didactical
Deadlock. demonstration
Processes scheduling
Week. 9 Memory management · Interactive
Architecture exposure
Alocatiopns: partitioned, paging, segmentation. • Explanation
Swapping · Conversation
Memory scheduling · Didactical
demonstration
Week. 10 Phisical I/O · Interactive
I/O chanels exposure
Zone tampon. · Explanation
Disk access scheduling · Conversation
· Didactical
· Diudcuicai

Week. 11 File Systems	Interactive
Concepts	exposure
Low-level implementations.	• Explanation
Directories	Conversation
Jurnalization; copy-on-write	Didactical
Example: FAT, EXT3, NTFS	demonstration
Week. 12 Operating systems booting	Interactive
	exposure
	Explanation
	Conversation
	Didactical
	demonstration
Week. 13 Linux kernel	Interactive
	exposure
	Explanation
	Conversation
	· Didactical
	demonstration
Week. 14 Windows kernel	Interactive
	exposure
	• Explanation
	Conversation
	· Didactical
	demonstration
Bibliography	
1 ALBING C VOSSEN LD NEWHAM C hash Co	alphaal O'Dailly 2007

1. ALBING C., VOSSEN J.P., NEWHAM C. bash Cookbook. O'Reilly, 2007

2. BOIAN F, VANCEA A. BOIAN R. BUFNEA D., STERCA A., COBARZAN C., COJOCAR D. Sisteme de operare Ed. Risoprint, 2006.

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7. RAYMOND E.S. The Art of Unix Programming. Prentice Hall, 2003.

8. STALLINGS W. Operating Systems: Internal and Design Principles. 6th edition, Prentice Hall, 2009.

9. TANENBAUM A.S. Modern Operating Systems. 3rd edition, Prentice Hall, 2009

10. Ubuntu - The Complete Reference. Richard Petersen, MCGraw-Hill, 2009

Windows 7 User Guide. Microsoft, 2009

8.2 Seminar / laboratory	Teaching methods Remarks
Unix: commands and text editors	• Interactive
	exposure
	• Explanation
	Conversation
	• Didactical
	demonstration
sed, grep, awk	Interactive
	exposure
	• Explanation
	Conversation
	1

	Didactical
Chall program	demonstration · Interactive
Shell program	
	exposure
	• Explanation
	Conversation
	· Didactical
	demonstration
C program under Unix using gcc	Interactive
	exposure
	• Explanation
	Conversation
	Didactical
	demonstration
Windows bat	Interactive
	exposure
	Explanation
	Conversation
	Didactical
	demonstration
Unix processes	Interactive
	exposure
	Explanation
	Conversation
	Didactical
	demonstration
Unix threads	Interactive
	exposure
	Explanation
	Conversation
	Didactical
	demonstration
Unix; thread + mutex	Interactive
	exposure
	Explanation
	Conversation
	Didactical
	demonstration
Windows processes	Interactive
1 A	exposure
	· Explanation
	· Conversation
	Didactical
	demonstration
Windows threads	· Interactive
	exposure
	· Explanation
	Conversation
	Didactical
	demonstration
	ucinonatiduon

Closing lab activities	Interactive
	exposure
	Explanation
	Conversation
	Didactical
	demonstration
Practical exam	Interactive
	exposure
	Explanation
	Conversation
	• Didactical
	demonstration

Bibliography

- 1. ALBING C., VOSSEN J.P., NEWHAM C. bash Cookbook. O'Reilly, 2007
- 2. BOIAN F, VANCEA A. BOIAN R. BUFNEA D., STERCA A., COBARZAN C., COJOCAR D. Sisteme de operare Ed. Risoprint, 2006.
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- 4. BOIAN F.M. FERDEAN C.M., BOIAN R.F., DRAGOS R.C. Programare concurentă pe platforme
- Unix, Windows, Java. Ed. Albastră, grupul Microinformatica, Cluj, 2002.
- 5. RAYMOND E.S. The Art of Unix Programming. Prentice Hall, 2003.
- 6. Ubuntu The Complete Reference. Richard Petersen, MCGraw-Hill, 2009

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- By learning the theoretical and methodological concepts and addressing the practical aspects of the Operating Systems course, students acquire a body of knowledge consistent, consistent with partial competencies required for possible occupations provided in Grid 1 RNCIS
- The course complies with IEEE and ACM Curriculla Recommendations for Computer Science studies.
- The course curriculum exists in universities and faculties in Romania
- The course content is very well appreciated by software companies whose employees and graduates of this course

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	The level of knowledge and understanding of the course subjects Problem solving	Written exam	30%
10.5 Seminar/lab activities	Ability to solve practical problems, specific to the course subjects, on the computer in a given amount of time	Practical exams in the middle of the semester and the last two weeks	25%
	Lab activity	Tests and projects	35%

10.6 Minimum performance standards Ø A minimum of 5 in the final grade

Date	Signature of course coordinator	Signature of seminar coordinator
20.04.2018	Assoc. prof. Rares Boian	Assoc. prof. Rares Boian

Date of approval

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Signature of the head of department Prof. Dr. Anca Andreica