SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	**Babes-Bolyai University**
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 / Qualification	**Informatics - english**

2. Information regarding the discipline

2.1 Name of the discipline (en) (ro)	**Operating systems** **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 Semester **2**	2.6. Type of evaluation	**E**	2.7 Type of discipline	**Mandatory**	
2.8 Code of the discipline	**MLE5007**					

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

3.1 Hours per week	**5**	Of which: 3.2 course	**2**	3.3 seminar/laboratory	**3**
3.4 Total hours in the curriculum	**70**	Of which: 3.5 course	**28**	3.6 seminar/laboratory	**42**
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 activities	• Lab rooms with Windows and UNIX operating system access • The requirements posted here http://www.cs.ubbcluj.ro/~rares/course/os/

6. Specific competencies acquired

Professional competencies	• Define notions, concepts, theories and models of basic operating systems. • 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 • Apply basic concepts and theories in the field of computer architecture, programming methods and operating systems project development professional • Ability to solve problems for low-level interface on OS kernels
Transversal competencies	• Execution of the tasks required under specified requirements and the deadlines imposed, with the rules of professional ethics and moral conduct • Information and permanent documentation in its field • Seeking to improve business results by engaging in professional activities

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

7.1 General objective of the discipline	• Identify the fundamental models and concepts of operating systems and computer networks. • Identify and explain the fundamental architectures for organizing and managing operating sistems and computer networks. • Aplying the methods for installing, configuring and managing operating sistems and computer networks. • Measure performance as time and resource consumption. Manage access permissions.
7.2 Specific objective of the discipline	• Apply working methods for efficient and organized activity, and develop a responsible atitude towards learning and researching, towards developing one's own potential, while repecting the professional ethics, principles and norms. • Apply effective methods and techniques for learning, investigating, and researching. Develop skills for applying knowledge to the needs of a dynamic society, communicating in Romanian and foreign language.

8. Content

8.1 Course	Teaching methods	Remarks
Week. 1 Unix: Introduction. ☐ Unix commands and arguments. ☐ Regular Expression, generic specification of files. ☐ Filters and text editors.	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
Week. 2 Shell Programming. ☐ Sh Processors. ☐ Variables, control structures (if, for, while, do, case). ☐ Embedded commands. ☐ Remarcable shell variables.	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
Week. 3. Windows: introduction. ☐ Commands and arguments. ☐ Files and paths; Access rights ☐ Command bat files	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
Week. 4 OS Unix: processes. ☐ Unix processes; structure, API (fork, wait, exec, exit, system, popen).	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
Week. 5 POSIX Threads ☐ Concepts. ☐ API: create, exit, join. ☐ Mutex variables.	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
Week. 6 Unix File System; I/O operations. ☐ Hard and symbolic links. ☐ Mounting. ☐ File access rights ☐ open, close, read, write, lseek, file lock.	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
Week. 7 General Theory of Operating Systems ☐ Classifications. ☐ Functions ☐ Architectures.	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
Week. 8 Processes. ☐ Concepts ☐ Concurrence. ☐ Semaphores. ☐ Critical sectioons and race conditions ☐ Deadlock.	• Interactive exposure • Explanation • Conversation • Didactical	

☐ Processes scheduling	demonstration	
Week. 9 Memory management ☐ Architecture ☐ Alocatiopns: partitioned, paging, segmentation. ☐ Swapping ☐ Memory scheduling	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
Week. 10 Phisical I/O ☐ I/O chanels ☐ Zone tampon. ☐ Disk access scheduling	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
Week. 11 File Systems ☐ Concepts ☐ Low-level implementations. ☐ Directories ☐ Jurnalization; copy-on-write ☐ Example: FAT, EXT3, NTFS	• Interactive exposure • Explanation • Conversation • Didactical 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 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.
3. BOIAN F.M. De la aritmetica la calculatoare. Ed. Presa Universitara Clujeana, Cluj, 1996.
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. BOIAN F.M.Servicii web;modele, platforme, aplicaţii. Ed. Albastră - grupul Microinformatica, Cluj, 2012
6. LUTZ M. Learning Python. O'Reilly, 2009.
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 • Didactical demonstration	
Shell program	• Interactive 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 exposure • Explanation • Conversation • Didactical demonstration	
Windows threads	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
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.
3. BOIAN F.M. De la aritmetica la calculatoare. Ed. Presa Universitara Clujeana, Cluj, 1996.
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	Written exam	30%
	Problem solving		
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			
➢ 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   Signature of the head of department

....   Prof. Dr. Anca Andreica