



COURSE PROGRAMME

1. Information about the programme

1.1 University	University "Alexandru Ioan Cuza" of Iasi
1.2 Faculty	Faculty of Computer Science
1.3 Department	Department of Computer Science
1.4 Domain	Computer Science
1.5 Cycle	Licence
1.6 Programme / Qualification	Computer Science (in English)

2. Information about the course

2.1 Course Name	Operating Systems						
2.2 Course taught by	Lecturer Ph.D. TRAIAN CRISTIAN VIDRASCU						
2.3 Seminary / laboratory taught by	Lecturer Ph.D. TRAIAN CRISTIAN VIDRASCU/ Teaching Assistant GHEORGHE BALAN						
2.4 Year	I	2.5 Semester	II	2.6 Type of evaluation*	E	2.7 Course type**	Ob

*E – Exam / C – Colloquium / V – Verification

**OB – Obligatory / OP – Optionally / F – Facultative

3. Total hours (estimated per semester and activities)

3.1 Number of hours per week	6	3.2 course	2	3.3 seminary/laboratory	4
3.4 Total number of hours	84	3.5 course	28	3.6 seminary/laboratory	28
Distribution					hours
Individual study using textbooks, course notes, bibliography items, etc.					28
Supplimentary study (library, on-line platforms, etc.)					10
Individual study for seminary/laboratory, homeworks, projects, etc.					28
Tutoring					0
Examination					3
Other activities					0
3.7 Total hours of individual activity*					69
3.8 Total hours per semester					125
3.9 Credit points					5

4. Pre-requisites - Curriculum (if necessary)

Computer architecture and operating systems, Introduction to programming (C language)

5. Conditions (if necessary)

5.1 Course	Video-projector, internet connection, blackboard in the classroom.
5.2 Seminary / Laboratory	Video-projector, internet connection, blackboard, computers on which a Linux distribution will be installed. The presence at the labs is mandatory.

6. Objectives

General objectives

1. Acquiring knowledge about operating systems, on techniques used for the design and implementation of them.
2. Learning abilities for using the Linux operating system.
3. Acquiring abilities for parallel processing and for programmatic use of the services offered by the Linux kernel.

Specific objectives

1. Understanding the basic concepts related to the operating systems, as well as the architecture of an operating system, with its main components and services.
2. Analyzing the algorithms that are used by an operating system for resource management.
3. Understanding how to use the text user interface for commands provided by the Linux operating system.
4. Understanding how to use the application programming interface provided by Linux, as well as the parallel processing techniques.
5. Implementing applications for the Linux platform, using the services provided by the Linux kernel.

7. Specific competencies/Learning outcomes

- The student/graduate describes, identifies and explains the operation and administration of computer networks and operating systems.
- The student/graduate proposes, designs, justifies the configuration, security assurance and optimization of IT infrastructures. The student/graduate designs, applies, operates, develops relational databases.
- The student/graduate ethically and responsibly builds secure and scalable IT solutions, collaborating with specialists from related fields.

8. Contents

8.1 Course	Teaching methods	Remarks (number of hours, references)
Linux: Overview of the Unix family of operating systems. OS: The basic concepts of operating systems.	Exposition, debate, case studies, exercises	2 hours
Linux: Basic commands and file systems. OS: Structure, components and services. The OS kernel.	Idem	2 hours
Linux: Overview of command interpreters (shells). OS: Process management (Part I).	Idem	2 hours
Linux: The scripting language bash. OS: Process management (Part II).	Idem	2 hours
Linux: GUI in Linux – X-Window system. The Windows Subsystem for Linux virtualisation environment. OS: Process synchronization (Part I).	Idem	2 hours
Linux: POSIX system calls for working with files. OS: Process synchronization (Part II).	Idem	2 hours
Linux: Exclusive access to files using locks on files. OS: Inter-process communication. Deadlocks.	Idem	2 hours
Linux: Working with memory-mapped files. OS: Memory management (Part I).	Idem	2 hours
Linux: Creating and synchronizing processes – fork and wait system calls. OS: Memory management (Part II).	Idem	2 hours
Linux: Process replacing – the exec system calls. OS: Memory management (Part III).	Idem	2 hours

8.1 Course	Teaching methods	Remarks (number of hours, references)
Linux: IPC through anonymous channels and fifos. OS: Storage devices management.	Idem	2 hours
Linux: Process notification through signals. OS: Information management – file systems.	Idem	2 hours
Linux: Text-mode UI, using ncurses library. OS: An introduction on virtual machines, computer networks and distributed systems.	Idem	2 hours

Bibliography

- A.Silberschatz, P.Galvin, G.Gagne : Operating System Concepts (10th edition), John Wiley & Sons, 2018.
- A.Tanenbaum, H.Bos : Modern Operating Systems (5th edition), Pearson, 2022.
- The course webpage: <https://edu.info.uaic.ro/sisteme-de-operare/>
- C.Vidrașcu : Sisteme de operare. Manual pentru ID, Editura Universității „Al.I.Cuza”, Iași, 2007.
- R.Stevens, St.Rago : Advanced Programming in the UNIX Environments (3rd edition), Pearson Education Inc., 2013.
- M.Kerrisk : The Linux Programming Interface – A Linux and UNIX System Programming Handbook, No Starch Press, 2010.

8.2 Seminary / Laboratory	Teaching methods	Remarks (number of hours, references)
Basic commands and file systems (Part I)	Exposition, exercises, individual work	2 hours
Basic commands and file systems (Part II)	Idem	2 hours
Overview of command interpreters (shells)	Idem	2 hours
The scripting language bash (Part I)	Idem	2 hours
The scripting language bash (Part II)	Idem	2 hours
POSIX system calls for working with files	Idem	2 hours
Exclusive access to files using locks on files	Idem	2 hours
Working with memory-mapped files	Idem	2 hours
Creating and synchronizing processes – the fork and wait system calls	Idem	2 hours
Process replacing – the exec system calls	Idem	2 hours
IPC through anonymous channels and fifos	Idem	2 hours
Process notification through signals	Idem	2 hours

Bibliography

- C.Vidrașcu : Sisteme de operare. Manual pentru ID, Editura Universității „Al.I.Cuza”, Iași, 2007.
- R.Stevens, St.Rago : Advanced Programming in the UNIX Environments (3rd edition), Pearson Education Inc., 2013.
- M.Kerrisk : The Linux Programming Interface – A Linux and UNIX System Programming Handbook, No Starch Press, 2010.
- C.Moroșanu, S.Pavăl : Sisteme de operare. Instalare, programare, utilizare LINUX. Editura Universității „Al.I.Cuza”, Iași, 2006.
- The course webpage: <https://edu.info.uaic.ro/sisteme-de-operare/>
- POSIX official documentation: The Linux man-pages project <https://www.kernel.org/doc/man-pages/>

9. Coordination of the contents with the expectations of the community representatives, professional associations and relevant employers in the corresponding domain

The content of the course provides the necessary skills to work on the Linux OS, the second platform (in addition to Windows) used as a target for the development of commercial applications by IT companies.

10. Assessment and examination

