#### card of course

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| Subject name | Linux / Unix server administration and services |

**1. The placement of the subject in the study system**

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| 1.1. Field of study | **Computer science** |
| 1.2. Form and path of study | **Full-time/Part-time** |
| 1.3. Level of education | **First-cycle studies** |
| 1.4. Study profile | **Practical** |

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| 1.5. Specialty | **Cybersecurity and computer forensics** |
| 1.6. Subject Coordinator | **Dr Rafał Stęgierski** |

**2. General characteristics of the subject**

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| 2.1. Belonging to a subject group | **Optional/practical** |
| 2.2. Number of ECTS | **4** |
| 2.3. Language of lectures | **English** |
| 2.4. Semesters in which the subject is taught | **III** |
| 2.5.Criteria for selecting course participants | **For specializations: Cybersecurity and computer forensics** |

1. **Learning outcomes and course delivery**
   1. **Subject Objectives**

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| **No.** | **Subject Objectives** |
|
| C1 | Familiarization with Linux/Unix server administration, its services and ways of managing them. |
| C2 | Familiarization with practical aspects of Linux/Unix system security in the context of internal resources and external threats. |
| C3 | Practical use of system tools and services to perform Linux/Unix server administration tasks. |

* 1. **Subject-specific learning outcomes, divided into knowledge , skills and competences , with reference to the directional learning outcomes**

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| --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Description of subject  learning outcomes** | **Reference to  directional effects**  **learning (symbols)** | **Method of implementation (mark "X")** | | | |
| **ST** | | **NST** | |
| **Classes at the University** | **Activities on  the platform** | **Classes at the University** | **Activities on  the platform** |
| After passing the course, the student knows and understands **the knowledge** | | | | | | |
| W1 | Has general theoretical knowledge of the structure and operation of the Linux/Unix operating system | INF\_W05  INF\_W12  INF\_W13 | X |  |  | X |
| W2 | Knows and understands the practical application of acquired knowledge in the field of Linux/Unix server administration and its services | X |  |  | X |
| W3 | Knows and understands the concepts and principles of data security in the context of Linux/Unix system software | X |  |  | X |
| After passing the course, the student is **able** to: | | | | | | |
| U1 | Is able to obtain information on Linux/Unix system administration from literature, documentation and other appropriately selected sources | INF\_U01 INF\_U02 INF\_U08 INF\_U25 INF\_U31 | X |  | X |  |
| U2 | Is able to analyze the functioning of a Linux/Unix server and its services using the tools and techniques learned | X |  | X |  |
| U3 | Is able to think and act in an orderly manner, correctly determines the order and importance of performing configuration tasks in the field of Linux/Unix service and system administration | X |  | X |  |
| U4 | Can implement the necessary Linux/Unix system security measures against unauthorized access | X |  | X |  |
| U5 | is able to independently educate himself/herself in the field of Linux/Unix system/service administration | X |  | X |  |
| After completing the course, the student is ready to take part in **social competences.** | | | | | | |
| K1 | Communicating using a variety of techniques and specialized terminology related to Linux/Unix systems in order to adapt services to the needs of the user and administration | INF\_K04 INF\_K05 | X |  | X |  |
| K2 | Solving Linux/Unix system administration problems, ensuring that their skills are used in accordance with law and ethics | X |  | X |  |
| K3 | Is aware of the social role of specialists in the field of Unix/Linux system security. Understands the need to formulate and provide the public with information on the use and security of the above systems and the services they provide | X |  | X |  |

**3.3. Forms of teaching and their number of hours - Full-time studies (ST), Part-time studies (NST)**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Path** | **Lecture** | **Exercises** | **Design** | **Workshop** | **Laboratory** | **Seminar** | **Lecturer** | **Classes conducted using distance learning methods and techniques in the form of a lecture** | **Other** | **ECTS points** |
| **ST** | 20 |  |  |  | 30 |  |  |  |  | 4 |
| **NST** |  |  |  |  | 15 |  |  | 10 |  | 4 |

**3.4. Content of education** (separately for each form of classes: (W, ĆW, PROJ, WAR, LAB, LEK, OTHER). It should be marked (X) how the given content will be implemented (classes at the university or classes on the e-learning platform conducted using distance learning methods and techniques)

**TYPE OF CLASS: LECTURE**

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| **No.** | **Content of the course** | **Reference to subject-specific learning outcomes** | **Method of implementation (mark "X")** | | | |
| **ST** | | **NST** | |
| **Classes at the University** | **Activities on  the platform** | **Classes at the University** | **Activities on  the platform** |
| 1. | Information about Linux/Unix: types and duration of distribution support, help system, license types. | W1, W2, W3 | X |  |  | X |
| 2. | System startup, system run levels, BASH command line, environment variables, internal and external commands, file system, directory organization, access rights, special access rights. | W1, W2, W3 | X |  |  | X |
| 3. | User and group management. | W1, W2, W3 | X |  |  | X |
| 4. | library , resource limits, authentication process configuration. | W1, W2, W3 | X |  |  | X |
| 5. | Setting disk quotas for users and groups ( disk quotas ). | W1, W2, W3 | X |  |  | X |
| 6. | OpenSSH package – basic operation and configuration. | W1, W2, W3 | X |  |  | X |
| 7. | DHCP server – service management. | W1, W2, W3 | X |  |  | X |
| 8. | DNS server – service management. | W1, W2, W3 | X |  |  | X |
| 9. | rsyslog , systemd-journal services . | W1, W2, W3 | X |  |  | X |
| 10. | Apache server – service management, configuration basics, virtual hosts. | W1, W2, W3 | X |  |  | X |
| 11. | Summary of classes and discussion of grades |  | X |  |  | X |

**TYPE OF CLASS: LABORATORY**

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| **No.** | **Content of the course** | **Reference to subject-specific learning outcomes** | **Method of implementation (mark "X")** | | | |
| **ST** | | **NST** | |
| **Classes at the University** | **Activities on  the platform** | **Classes at the University** | **Activities on  the platform** |
| 1. | Information about Linux/Unix: types and duration of distribution support, help system, types of licenses - exercises. | U1, U2, U3, U4, U5, K2 | X |  | X |  |
| 2. | System startup, system run levels, BASH command line, environment variables, internal and external commands, file system, directory organization, access rights, special access rights - exercises. | U1, U2, U3, U4 **,** K2 | X |  | X |  |
| 3. | User and group management. | U1, U2, U3, U4 **,** K3 | X |  | X |  |
| 4. | PAM library, resource limits, authentication process configuration - exercises. | U1, U2, U3, U4, U5 **,** K3 | X |  | X |  |
| 5. | Setting disk quotas for users and groups ( disk quotas ) - exercises. | U1, U2, U3, U4, U5 **,** K1 | X |  | X |  |
| 6. | OpenSSH package – basic operation and configuration - exercises. | U1, U2, U3, U4, U5 | X |  | X |  |
| 7. | DHCP server – service management, configuration basics. | U1, U2, U3, U4, U5 **,** K2 | X |  | X |  |
| 8. | Logging system – rsyslog services , systemd-journal - exercises. | U1, U2, U3, U4, U5 **,** K2 | X |  | X |  |
| 9. | DNS server – service management, configuration basics. | U1, U2, U3, U4, U5 **,** K2 | X |  | X |  |
| 10. | Apache server – service management, configuration basics, virtual hosts exercises. | U1, U2, U3, U4, U5 **,** K2, K3 | X |  | X |  |
| 11. | Summary of classes and discussion of grades |  | X |  | X |  |

**3.5. Methods of verifying learning outcomes** (indication and description of methods of conducting classes and verification of achievement of learning outcomes and method of documentation)

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| --- | --- | --- | --- |
| **Subject Effects** | **Teaching methods** | **Methods of verifying learning outcomes** | **Documentation methods** |
| **KNOWLEDGE** | | | |
| **W1-W3** | Lecture with the use of multimedia | Passing the lecture:  Exam: A test containing a set of 20 questions  Score 3: 11 – 12 points  Rating 3.5: 13 – 14 points  Score 4: 15 – 16 points  Rating 4.5: 17 – 18 points  Score 5: 19 – 20 points | Exam on the PUW platform |
| **SKILLS** | | | |
| **U1-U5** | Working with virtual systems  Doing exercises | Passing the lab:  Students perform a network services project based on Linux ( Debian ): they configure the operating system, install network services, test the correctness of installed services. They verify the correctness of the systems operation by analyzing logs. | Files uploaded to PUW platform |
| **SOCIAL COMPETENCES** | | | |
| **K1-K3** | Working with virtual systems  Doing exercises | Passing the lab:  Students perform a network services project based on Linux ( Debian ): they configure the operating system, install network services, test the correctness of installed services. They verify the correctness of the systems by analyzing logs. | Files uploaded to PUW platform |

**3.6. Assessment criteria for the achieved learning outcomes**

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| **Learning effect** | **For a grade of 3 or " zal ."**  **the student knows and understands/is able to/is ready to** | **For a grade of 3.5, the student knows and understands/is able to/is ready to** | **For a grade of 4, the student knows and understands/is able to/is ready to** | **For a grade of 4.5, the student knows and understands/is able to/is ready to** | **For a grade of 5, the student knows and understands/is able to/is ready to** |
| W | 51-60% of knowledge indicated in learning outcomes | 61-70% of knowledge indicated in learning outcomes | 71-80% of knowledge indicated in learning outcomes | 81-90% of knowledge indicated in learning outcomes | 91-100% of knowledge indicated in learning outcomes |
| U | 51-60% of skills indicated in learning outcomes | 61-70% of skills indicated in learning outcomes | 71-80% of skills indicated in learning outcomes | 81-90% of skills indicated in learning outcomes | 91-100% of skills indicated in learning outcomes |
| K | 51-60% of skills indicated in learning outcomes | 61-70% of skills indicated in learning outcomes | 71-80% of skills indicated in learning outcomes | 81-90% of skills indicated in learning outcomes | 91-100% of skills indicated in learning outcomes |

**3.7. Literature**

**Basic:**

1. Kyle Rankin, Benjamin Mako Hill, Ubuntu Serwer. Oficjalny podręcznik. Wydanie II,
2. Linux Proffesional Institute Linux Essential https://learning.lpi.org/en/learning-materials/010-160/
3. Linux Proffesional Institute Security Essential https://learning.lpi.org/en/learning-materials/020-100/

**Supplementary:**

1. https://linux-training.be/
2. https://www.linuxtopia.org/

**4. Student workload - ECTS points balance**

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| --- | --- | --- |
| **Types of student activity** | **Student Load** | |
| **ST** | **NST** |
| **Classes requiring direct contact between the student and the academic teacher at the university premises** | **50** | **25** |
| Classes included in the study plan | 50 | 25 |
| **Student's own work** | **50** | **75** |
| Ongoing preparation for classes, preparation of project work/presentations/etc. | 25 | 35 |
| Preparation for passing classes | 25 | 40 |
| **TOTAL STUDENT HOURLY LOAD** | **100** | **100** |
| **Number of ECTS points** | **4** | **4** |

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| Last change date | 30/09/2024 |
| The changes were introduced | INF Education Quality Team |
| The changes were approved | Arkadiusz Gwarda, M.A. |