#### card of course

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| Subject name | Network Security |

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 Michał Kalisz; mgr Emil Tomczyk |

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 | IV |
| 2.5.Criteria for selecting course participants | For students who have chosen the Cybersecurity and Computer Forensics specialization |

1. Learning outcomes and course delivery
   1. Subject Objectives

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| No. | Subject Objectives |
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| C1 | Familiarization with topics related to network firewalls – firewall, VPN tunneling and IPsec protocol. |
| C2 | Familiarization with the topic of wireless networks and mobile devices – infrastructure security. |
| C3 | Acquiring skills in analyzing the security of protocols and devices of individual layers of the OSI model. |
| C4 | Acquiring skills in security monitoring, intruder detection, and security analysis through the use of logs, event logs, and collected statistics. |

* 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 | The student knows the theoretical basics of computer networks. | | INF\_W14 |  | X |  | X |
| W2 | The student has knowledge of the OSI/ISO model of computer networks. | |  | X |  | X |
| W3 | The student has knowledge of the mechanisms of operation and use of IPsec, FireWALL and VPN. | |  | X |  | X |
| W4 | The student has knowledge of the security of wireless networks and mobile devices. | |  | X |  | X |
| W5 | The student has knowledge of security monitoring, intruder detection, security analysis using logs, event logs and collected statistics. | |  | X |  | X |
| After passing the course, the student is **able** to: | | | | | | | |
| U1 | Student is able to present types of computer networks, network topologies. Characterize the OSI/ISO model of computer networks, principles of operation of FireWALL, VPN, IPsec. | | INF\_U07 INF\_U08 INF\_U16 INF\_U25 | X |  | X |  |
| U2 | The student is able to present the characteristics of security-oriented wireless networks and mobile devices. | | X |  | X |  |
| U3 | The student is able to characterize security monitoring, intruder detection, security analysis using logs, event logs and collected statistics. | | X |  | X |  |
| After completing the course, the student is ready to take part in **social competences.** | | | | | | | |
| K1 | Understands the need to develop knowledge about computer networks and the mechanisms of their operation. | | INF\_K01 | X |  | X |  |
| K2 | Is able to convey acquired knowledge in an understandable way. | | X |  | X |  |
| K3 | Understands the need to develop knowledge about computer network security and security mechanisms. | | 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 ………………. | Other | **ECTS points** |
| **ST** | 20 |  |  |  | 30 |  |  |  |  | 4 |
| **NST** | 10 |  |  |  | 15 |  |  |  |  | 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. | Security of protocols and devices of individual layers of the OSI model. | W1, W2 |  | X |  | X |
| 2. | Firewalls – firewall. | W3 |  | X |  | X |
| 3. | Wireless technologies - infrastructure security. | W4 |  | X |  | X |
| 4. | Monitoring in computer networks. | W5 |  | X |  | X |
| 5. | Security Analysis of Tool Usage Methods | W4, W5 |  | X |  | X |
| 6. | 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. | Security of protocols and devices of individual layers of the OSI model. , network firewalls - firewall, VPN tunneling and IPsec protocol - laboratory exercises. | U1, K1, K3 | X |  | X |  |
| 2. | Firewalls – Firewall, VPN Tunneling and IPsec – Lab Exercises. | U1, U2, K1, K2, K3 | X |  | X |  |
| 3. | Wireless networks and mobile devices – infrastructure security – laboratory exercises. | U1, U2, K1, K2, K3 | X |  | X |  |
| 4. | Security monitoring, intruder detection in computer networks – laboratory exercises. | U1, U2, U3, K1, K2, K3 | X |  | X |  |
| 5. | Security analysis using logs, event logs and collected statistics – laboratory exercises. | U1, U2, K1, K2, K3 | X |  | X |  |
| 6. | 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-W5 | Informative, conversational lecture with the use of multimedia | Use of materials and content contained in the lecture to pass the examination. | Examination sheet |
| SKILLS | | | |
| U1-U3 | Practical tasks. | Practical task "Configuration and analysis of network security" The student configures a firewall, implements a VPN connection using the IPsec protocol, and analyzes network logs to detect potential threats. The task also includes the security of wireless networks and mobile devices.  (100% final grade from lab) | Evaluated task, PUW platform |
| SOCIAL COMPETENCES | | | |
| K1-K3 | Practical tasks. | Practical task "Configuration and analysis of network security" The student configures a firewall, implements a VPN connection using the IPsec protocol, and analyzes network logs to detect potential threats. The task also includes the security of wireless networks and mobile devices.  (100% final grade from lab) | Evaluated task, PUW platform |

3.6. Assessment criteria for the achieved learning outcomes

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| Learning effect | For a grade of 3 or "pass."  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. National Institute of Standards and Technology Security and Privacy Controls for Information Systems and Organizations” (NIST SP 800-53) - National Institute of Standards and Technology (NIST), CreateSpace, Scotts Valley, 2017
2. Ranjbar Amir S, Troubleshooting and maintaining Cisco IP networks (TSHOOT) : foundation learning guide : foundation learning for the CCNP TSHOOT 642-832 Cisco Press; Indianapolis 2010
3. „802.11. Bezpieczeństwo” - Bruce Potter, Bob Fleck, Helion
4. „Konfiguracja Firewalli CISCO ASA w programie Packet Tracer” - Jerzy Kluczewski, Damian Strojek Helion.

**Supplementary**

1. Teare Diane, Implementing Cisco IP routing (ROUTE) : foundation learning guide : foundation learning for the ROUTE 642-902 exam Cisco Press, Indianapolis, 2010
2. NIST Computer Security Incident Handling Guide - https://csrc.nist.gov/pubs/sp/800/61/r3/ipd
3. Bezpieczeństwo w sieci E. Schetina, J. Carlson, K. Green – Helion.
4. Odom Wendell. Cisco CCNA : routing and switching ICND2 200-101 : przygotowanie do egzaminu na certyfikat : oficjalny, Warszawa, Wydawnictwo Naukowe PWN, 2015.

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 | 40 |
| Preparation for passing classes | 25 | 35 |
| **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. |