



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Access protection in distributed multimedia systems [S1Cybez1>ODwRSM]

### Course

Field of study  
Cybersecurity

Year/Semester  
3/5

Area of study (specialization)  
–

Profile of study  
general academic

Level of study  
first-cycle

Course offered in  
Polish

Form of study  
full-time

Requirements  
elective

### Number of hours

Lecture  
24

Laboratory classes  
16

Other  
0

Tutorials  
0

Projects/seminars  
16

### Number of credit points

4,00

### Coordinators

dr hab. inż. Dawid Mieloch prof. PP  
dawid.mieloch@put.poznan.pl

### Lecturers

### Prerequisites

A student starting this subject should have basic knowledge of the basics of telecommunications, digital signal processing and introduction to multimedia. They should have the ability to perform calculations using mathematical tools from the field of mathematical analysis and probability theory and to obtain information from indicated sources. They should also understand the need to expand their competences. In addition, in terms of social competences, the student must present such attitudes as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

### Course objective

The aim of the subject "Access protection in distributed multimedia systems" is to familiarize students with multimedia transmission methods, various threats and attacks that distributed multimedia systems are subject to, and techniques and tools used to secure them. As part of this subject, students gain knowledge about the architecture of typical systems used for streaming and recording video. They develop skills in analyzing and identifying potential threats and taking appropriate preventive measures to secure distributed video transmission and video surveillance systems against unauthorized access and manipulation.

### Course-related learning outcomes

## Knowledge

K1\_W05 Has advanced knowledge of complex data structures; knows the basics of theory, knows the principles of data administration and related standards; knows the principles of cybersecurity and privacy used to manage the risks associated with the use, processing, storage and transmission of information or data.

K1\_W07 Has in-depth knowledge of types and architectures and of designing, configuring and maintaining computer networks; knows and understands the protocols, algorithms and mechanisms used in them.

K1\_W11 Has in-depth knowledge of designing, configuring and maintaining computer systems, including distributed systems; knows and understands the mechanisms used in them.

K1\_W14 Has general knowledge related to key issues in the field of distributed processing; has advanced detailed knowledge of cloud computing offered on the market; knows cloud service models and concepts related to security, management, orders and administration; knows the economic, legal and other conditions for the activities of companies offering cloud services.

## Skills

K1\_U02 Is able to use appropriately selected methods and tools, including advanced information and communication techniques, and is able to develop simple applications or configure simple systems in order to simulate, analyze and design systems or applications appropriate to the field of study

K1\_U10 Based on available documentation, specifications and standards, is able to design and implement a secure web or mobile application in high-level languages

K1\_U14 Has foreign language skills at level B2 of the Common European Framework of Reference for Languages, and is able to read and understand catalog cards, standards, technical documentation and operating instructions for systems and devices appropriate to the field of study

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## Social competences

K1\_K01 Understands the importance of improving professional, personal and social competences; is aware that knowledge and skills in the area of cybersecurity are rapidly evolving

K1\_K02 Understands the importance of knowledge in solving problems in the area of cybersecurity; is aware of the need to use expert knowledge when solving engineering tasks in a scope beyond one's own competences

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

a) in the scope of lectures, verification of the assumed learning outcomes is carried out by: • assessment of knowledge demonstrated in the exam. The exam consists of answering questions and solving problems. To obtain a grade of 3.0, it is necessary to obtain at least 50% of points; 3.5 – 60% of points; 4.0 – 70% of points; 4.5 – 80% of points; 5.0 – 90% of points. b) in the scope of laboratory exercises, verification of the assumed learning outcomes is carried out by: • substantive assessment of the performance of laboratory tasks, • obtaining additional points for activity during classes

The course completion rules and the exact passing thresholds will be communicated to students at the beginning of the semester through the university's electronic systems and during the first class meeting (in each form of classes).

## Programme content

1. Introduction to Distributed Multimedia Systems (DMMS)
2. Security Threats in DMMS
3. Access Protection Mechanisms in DMMS
4. Case Studies and Examples
5. Future Trends and Challenges

## Course topics

- Definition of DMMS and its components (multimedia databases, information servers, clients)

- Evolution of DMMS: from small LANs to supporting mobile devices and high-bandwidth applications
- New challenges in DMMS design: wireless connectivity, scalability, supporting a large number of clients, diversity of devices and applications
- Key technologies and solutions: media streaming, buffering, QoS
- Overview of multimedia data transmission methods
  - o Broadcast television services: Cable, terrestrial, satellite, creation of transport stream, encryption and conditional access methods (DRM), synchronization of transmitter and receiver.
  - o Internet services: IPTV, architecture of modern streaming media, comparison of streaming methods, examples of efficient video streaming methods.
- Unauthorized access to multimedia content
- Denial-of-Service (DoS) attacks
- Data theft
- Malware distribution
- Impersonation of users or servers
- Authentication and authorization: Methods for authenticating users and devices. Access control. Content access rights management. Encryption of multimedia content.
- DoS protection: Mechanisms for detecting and preventing DoS attacks. Redundancy and load balancing. Bandwidth throttling and traffic filtering
- Data security: Protection against data loss and corruption. Data backup and recovery
- Analysis of existing DMMS systems and their security mechanisms
- Best practices for access protection in DMMS
- New technologies and their impact on DMMS security (e.g. cloud computing, Internet of Things)
- Development of artificial intelligence and machine learning in the context of DMMS security
- Ethical and legal issues related to access protection in DMMS

## Teaching methods

Lecture: supported by presentation and examples of sound, images and vision. Laboratories: implementation of projects on computers (independently or in groups).

## Bibliography

D. Bull – Communicating Pictures, Elsevier, 2014

B. Bing – Next-Generation Video Coding and Streaming, Wiley, 2015

Additional

M. Domański – Obraz cyfrowy, Wydawnictwa Komunikacji i Łączności WKŁ, 2011

D. Karwowski – Zrozumieć kompresję obrazu, www.zrozumieckompresje.pl, 2019

## Breakdown of average student's workload

	Hours	ECTS
Total workload	116	4,00
Classes requiring direct contact with the teacher	56	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,00