

# Master Degree Exam Requirements

## Applied Informatics

### Technologies of Informatics

2024

**1. Object persistence**

Essential principles and tools, object-relational mapping, Java Persistence API, common implementation problems

**2. Java EE Web technologies**

Servlets, Java Server Pages, MVC design pattern on the Web, multi-layered architectures, web frameworks, tools, web container

**3. Languages and formats for the transmission of data**

XML and its structure, methods describe the structure of the XML, transformations of the XML, software processing (parsers, generators), JSON and its structure, software processing; Another formats (CSV, YAML, ...).

**4. Data Warehousing and OLAP**

Relational and multidimensional database model, operational database, data warehouse, data mart, building and running of a data warehouse, ETL proces, OLAP tchnics and OLAP operations over a data cube.

**5. Basic features of distributed database systems**

Advantages, disadvantages, basic functionality. Distributed database design – data fragmentation and allocation. Distribution in commercial systems.

**6. Query optimisation and data replication**

Distributed query optimisation. Data replication. Applications of the replication.

**7. Data and Information Protection and Security**

Viruses and other malicious software, basic principles of anti-virus protection. Data protection and recovery in a local PC. Data protection and recovery in a networking environment. Data and information protection in an information system. Legal aspects of data and information protection.

**8. Cryptography – essential approaches and terminology**

Cryptographic system, key, time and memory efficiency, cryptographic protocol, monoalphabetic and polyalphabetic ciphers, symmetric and asymmetric ciphering, recent ciphering systems - principles, DES, RSA, etc.

**9. Structure and architecture of UNIX / GNU/Linux systems**

system structure, file system, system process, OS services, shells, instructions of shells, kernel description, kernel data structure, system buffers, I/O subsystem, memory management, real-time operating systems (basic characteristics, the main factors, definition, hard and soft RTOS, RMS, EDF, RTOS examples)

**10. Process control in UNIX (GNU/Linux) system**

process creation, signals, process termination, invocation by other process, real and efficient UID, process sizing, process management, process scheduling, SysRQ (usage, functions)

**11. Basic UNIX (GNU/Linux) user administration**

managing files and directories, operations with files and directories, searching file systems, user identity, process identity, identity file and change, access control and access control settings, input/output redirection, command interconnection, user administration, backup, programs for data archiving and data compression, working in command interpreters, SMART technology (meaning, usage, selected values)

**12. Classification of Mobile devices**

Operating systems, producers, principles of operating, application software, connectivity, specific problems of mobile devices. Mobile clients of information system. Mobile context and sensors, LBS applications.

**13. Application development for mobile platforms**

Android SDK, Java ME, iOS, Windows Phone - development tools, principles, GUI design, principles of communication.