Technical Communication (GEIAK100-B2A)

Description	The main purpose of the course is to introduce students to the fundamental theories and methods of information systems. Topics include basic logic, number systems, systems theory, information representation, coding and encryption, semantics, modelling principles, and the fundamentals of computer-aided modelling.
Semester	Autumn, 2025
Neptun code	GEIAK100-B2A
Instructors	Dr. Károly Nehéz, Associate Professor Áron Kiss, Teaching Assistant.
Credit Hours	2 hours lecture + 2 hours practice per week
Attendance Requirement	Students are required to attend at least 60% of the scheduled classes to be eligible to receive the course signature.
Signature	Students must successfully complete two practical assignments and pass the midterm exam in order to obtain the course signature.
Examination	The written examination consists of theoretical questions and practical tasks based on the course material.

Lecture Notes

1. Information - Basics
2. Information - Processing
3. Information - Coding
4. Information - Coding 2
5. Information - Syntax
6. Information - Semantics
7. Information - Encryption

Practices

1. Mathematical Expressions in LaTeX
2. Basics of the HyperText Markup Language
3. Cascading Style Sheets
4. Interactive Practice of CSS
5. Conditional Probability and Information Theory Exercises
6. Combinatorics Exercises
7. OnShape Sketching:
    1. OnShape - Introduction to Sketching
8. OnShape Part Designing:
    1. Model train (document)
    2. Designing a Model Train (booklet)
    3. Designing a Model Train (video tutorial)
    4. **Homework:** OnShape - Part Design Using Part Studios
9. OnShape Assemblies:
    1. Nutcracker assembly drawings
    2. START document
        1. **Task:** Construct the *piston*, *connection*, and *handle* parts, then assemble the machine!

    3. FINISHED document
    4. **Homework:** Onshape - Assemblies
10. Encoding and Encryption Exercises

Additional Notes

1. Formulas for Mathematical Exercises
2. Introduction to CAD course

Examination Questions

1. The three types of sciences: inductive, deductive, and reductive. An overview of the scientific method.

2. The hierarchical levels of information, the concepts of sets and systems, the multi-level model of informational properties, and the concept of a signal and its basic types.

3. The quantitative properties of information, the concept of relative frequency, probabilities in finite event systems, Shannon's information-measuring function, the statistical properties of message sets, and the entropy and redundancy of a message set.

4. The syntactic properties of information. The concept of a code. Properties of different code types. Encoding messages, the Shannon-Fano procedure.

5. The concept of parity bit, Hamming distance, and correcting a 1-bit error in 16-bit data.

6. Other error detection and correction methods: the concept of a checksum. Elias block protection.

7. Checksum. The protection algorithm of bank card numbers and tax numbers.

8. Simple compression methods: RLE coding, LZW coding.

9. Character codes: ASCII codes, Unicode, UTF-8 encoding and decoding.

10. Demonstration of Base64 encoding and decoding.

11. Demonstration of JPEG and MPEG compression, including their key properties.

12. The syntax of languages: demonstration of Backus-Naur (BN) form, syntax graphs, JSON schema. The essence of XML and DTD.

13. Implementation of key exchange over an eavesdropped channel.

14. The essence of RSA encryption.

15. Hash codes and their properties, password storage.

16. Digital signatures with and without hash codes.