Syllabus for the Course «Project Management»

1. General Course Characteristics

The discipline aims to develop a systemic understanding of lifecycle management for development projects of digital, cyber-physical and human-cyber-physical systems.

The course treats a project not only as a management activity but primarily as a process of creating, implementing and operating a complex engineering system.

Within the discipline, students study:

- project mission and goal formulation;
- user and stakeholder need analysis;
- pre-project assessment and investment decision-making;
- requirements management;
- digital system development organisation;
- configuration and version management;
- quality and non-conformance management;
- project team and management structure organisation;
- classical and agile project management methods;
- system lifecycle management during operation.

Special attention is given to:

- the pre-project stage, which determines project viability;
- the operational stage, where digital systems evolve and mature;
- using LLMs (Large Language Models) and intelligent assistants in project management.

The practical part is built around a cross-cutting group project that goes through all stages of a digital system's lifecycle.

LLMs are used as:

- an intelligent analytical tool;
- a project documentation development assistant;
- a requirements and risk analysis tool;
- a means of engineering reflection.

The discipline belongs to the professional cycle of Master's training in Information Systems and Technologies (09.04.02).

It develops a systemic understanding of complex digital system development and provides a methodological foundation for:

- Information Systems Architecture;
- Systems Engineering;
- Distributed Systems;
- Operational Engineering;
- Digital Platforms;
- Project Activities.

The course focuses on the digital system lifecycle:

idea → pre-project assessment → development → implementation → operation → modernisation → decommissioning

The course connects three knowledge areas:

- systems engineering;
- project management;
- organisational theory of complex system development.

2. Learning Objectives

The objective is to develop students' systemic competencies in organising and managing the development of digital systems of various scales and complexity levels.

Special attention is given to:

- formulating a project mission;
- identifying user needs;
- conducting pre-project assessments;
- managing requirements and configurations;
- organising development teams;
- planning and controlling project implementation;
- managing the operation and development of digital systems.

A separate objective is to develop skills in using LLM assistants in engineering and management activities.

3. Course Tasks

Key tasks include:

- developing an understanding of digital system project nature;
- learning the project lifecycle structure;
- mastering user need analysis methods;
- mastering pre-project assessment methods;
- learning requirements management methods;
- learning configuration and version management methods;
- mastering development quality management methods;
- learning project team organisational models;
- mastering calendar planning methods;
- mastering project management tools;
- learning agile and classical development methodologies;
- developing project documentation skills;
- mastering LLM use in project management.

4. Expected Learning Outcomes

Upon completing the discipline, students should:

Know:

- project lifecycle structure;
- methods for identifying user needs;
- principles of requirements management;
- configuration management methods;
- development quality management methods;
- project team organisational structures;
- project calendar planning methods;
- principles of classical and agile project management;
- principles of digital system operation and development.

Be able to:

- formulate project missions and goals;
- analyse user needs;
- conduct pre-project assessments;
- develop system architectural concepts;
- create requirement specifications;
- organise project team structures;
- build project calendar plans;
- develop project documentation;
- use LLM assistants in project activities.

Possess skills in:

- requirement analysis and structuring;
- project planning methods;

- project management tools;
- project documentation skills;
- using intelligent assistants in project management.

5. Methodological Concept

The discipline is built around the engineering logic of a digital system lifecycle.

Key lifecycle stages:

Need identification.
Project idea generation.
Pre-project assessment.
Architectural design.
System development.
Implementation.
Operation.
Modernisation.
System decommissioning.

An important feature is treating the operational stage as an independent system development phase. During this stage:

- system usage experience accumulates;
- new requirements emerge;
- system functionality evolves;
- architecture modernises.

6. Project Types Covered

The course covers projects including:

- digital information systems;
- enterprise information systems;
- digital services;
- digital platforms;
- cyber-physical systems;
- industrial automation systems;
- IoT systems;
- digital twins;
- human-cyber-physical systems;
- intelligent services;
- user-digital system interaction platforms.

Projects are studied at various scales:

- small teams (5–7 people);
- medium teams (20–50 specialists);
- large distributed projects (hundreds of participants).

7. Project Team Organisation

The course examines various project team models:

- Startup: high uncertainty and organisational flexibility.
- Specialised company: focused on sustainable development in a specific competence area.
- Corporation: large-scale projects and complex organisational structure.

8. Project Management Methods

Two main approaches are covered:

- Classical project management:
  - based on sequential project stage implementation (Waterfall);
  - practical calendar planning using Microsoft Project.
- Agile project management:
  - iterative development;
  - team self-organisation;
  - continuous feedback.

9. Project Information Space

Special attention is given to organising the project information space, which includes:

- project documentation;
- system architectural descriptions;
- requirement specifications;
- project progress reports;
- project knowledge base.

10. Role of LLMs and Intelligent Assistants

LLMs are used in three main modes:

- Handbook: explaining terms and methods.
- Training assistant: interactive solution discussion.
- Engineering controller: analysing project decisions and documentation.

LLMs support:

- requirement analysis;
- project risk analysis;
- project documentation generation;
- decision-making support.

11. Educational Technologies

The course uses AI-augmented learning, including:

- lectures;
- seminars;
- digital laboratory work;
- group project activities;
- LLM assistant use.

12. Practical Course Component

The practical part revolves around a cross-cutting group project. Students develop a digital system through these stages:

Project idea formulation.
User need analysis.
Pre-project assessment.
System architectural concept.
Requirement formulation.
Project planning.
Team organisation.
System operation strategy development**.**

CALENDAR-THEMATIC SCHEDULE

Key:

- Lecture — theoretical material delivery.
- Practical — hands-on activities, including LLM use where applicable.
- Independent Study — hours for self-directed work on the project and related materials.

Week	Content	Lect. (h)	Sem. (h)	IS (h)
1	**Digital and cyber-physical system projects: Scales and types** — Project as a form of complex system development organisation; — Digital, cyber-physical and human-cyber-physical projects; — Project scales (small teams, medium teams, large distributed projects).	2	2	2
2	**Project mission, goals and values** — Project mission; — Goals and objectives; — Stakeholder interests; — Conflict of interests between client, developers and users.	2	2	2
3	**User and stakeholder needs** — Stakeholders; — User and business needs; — Requirement elicitation methods.	2	2	2
4	**Pre-project stage and project assessment** — Pre-project analysis; — Technical, economic and organisational assessment; — Investment decision.	2	2	2
5	**Architectural concept of a digital system** — Information system architecture; — Components, interfaces and data flows.	2	2	2

6	**Requirements management** — Requirements classification; — Traceability; — Managing requirement changes.	2	2	2
7	**Configuration and version management** — System configuration; — Version management; — Change control.	2	2	2
8	**Quality and non-conformance management** — Defects and non-conformances; — Development quality management.	2	2	2
9	**Project team organisation** — Project roles; — Full-time teams; — Matrix project management structure.	2	2	2
10	**Types of organisations and project implementation forms** — Startup, specialised company, corporation; — Core and supporting projects.	2	2	2
11	**Classical project management** — Waterfall model; — Development phasing; — Calendar planning.	2	2	2
12	**Agile approaches and team self-organisation** — Agile methodologies; — Iterative development; — Backlog.	1	2	2
13	**Project information space and development documentation** — Project documentation; —	1	2	2

	Knowledge management; — Architectural documentation.			
14	**System operation and development** — Operation organisation; — Support; — Modernisation; — Access management and information security.	1	2	2
15	**Project closure and system decommissioning. Role of AI assistants in project management** — Project closure; — Data migration; — Archiving; — Agent-based project management systems.	1	1	3
16	**Session: Presentation of the project lifecycle, system architecture, development plan and operation strategy**	—	—	—