**ANNOTATION**

**of a syllabus for**

**IT-PROJECT MANAGEMENT**

1. **Total labor intensity** *(in Credit Units) – 5 ECTS*
2. **Course sequencing**

The academic discipline **IT project management** belongs to the project activity module of the educational program.

This discipline is based on the knowledge, skills and abilities that are formed at the previous level of education.

The knowledge, skills and abilities, formed by the academic discipline **IT project management**, are necessary to build a conceptual system for further practical application in the implementation of projects in the computer technologies, during various types of internship, including pre-graduate, also, in scientific and professional activities or in final qualification work creation process. Among the disciplines that require the knowledge, skills and abilities formed by the discipline **IT project management**, the following can be distinguished: Research project.

1. **Course aims**

– To form the knowledge, abilities and skills that serve as the basis for the readiness of undergraduates for the practical implementation of effective IT project management processes in scientific and professional activities.

– Meet the needs of employers for personnel who understand the content of IT project management processes in the field of computer and information technologies and possess the necessary system of methodological knowledge for their implementation.

The main stages of project management in the fields of software engineering, system analysis and management, information systems, applied mathematics and computer science, and tools for their implementation are the basis for setting tasks and selecting the content of the discipline.

1. **Course topics**

**Theme № 1. The concept of project management.**

Main principles, purpose, approaches, basic examples, effectiveness of project implementation with proper planning and management.

**Theme № 2. Modern concept of management of IT projects, international practice.**

Historical aspects and prerequisites for the development of the project management method. First project management systems. The Soviet Union system of project management. Modern approaches and their evolution. World practice of IT project management. Experience in implementing the management concept in large companies.

**Theme № 3. Fundamentals of project management.**

The quality of a managed project. Preparation of the project for implementation of modern management methods. Accents and main points of attention for implementation. Risks of implementing a project management system into real applications.

**Theme № 4. The development of the project. Project life cycle.**

Main stages of it project development. Life cycle of an IT project. The path of the project from initiation to implementation. Loops and cycles of the project. Applications and additional tools to support the project. Analysis of project requirements, development of technical specifications. Information systems development lifecycle models, their advantages and disadvantages: cascading, test-driven development, prototype-based model, spiral, modern agile development technologies. Stages of information system development in accordance with GOST 34.601-90 Automated systems: Stages of creation.

**Theme № 5. Development of the project concept and evaluation of its effectiveness.**

Concept of the project. Development and fixing of the project's conceptual profile. Project portfolio. Investment profile of the project. Project risks. Risk management techniques. Management of the IT project execution process like content, terms, risks, quality, cost, etc. Project purpose and content. Types of software requirements and their properties. Methods for data collecting, analyzing, and documenting. Terms of reference (TOR) for creating an information system. Standards for the development of technical specifications and their requirements. The content of the TOR in accordance with GOST 34.602-89 Terms of reference for creating an automated system. The content of the TOR in accordance with GOST 19.201-78 Terms of reference, requirements for content and design. Contents of the TOR in accordance with IEEE STD 830-1998. The content of the TOR in accordance with ISO/IEC/IEEE 29148-2011.

**Theme № 6. Methods of evaluating the effectiveness of the project.**

Basic analysis of the performance of IT projects at all stages of its life cycle. A mathematical approach to evaluating the effectiveness of the project. Project model. System of factors that affect the project.

**Theme № 7. Project planning.**

Project planning methodology. Visualization of project plans. Charts and tables. Flexible planning system and consideration of project implementation factors. Determining the composition of operations. The concept of the hierarchical structure of work (ISR). Methods for ISR developing: template-based, incoming wave method. The definition of the relationships between operations. Types of operation dependencies: mandatory, arbitrary, and external. Estimation of the duration of operations. Methods for duration evaluating: expert evaluation, analog evaluation, parametric evaluation, three-point evaluation, and reserve analysis. Development of the project schedule. Scheduling methods: critical path method, schedule compression, scenario analysis, resource alignment, critical chain method.

**Theme № 8. Managing project schedule. Project risks.**

IT Project time management systems. Accounting for individual work hours of project employees. Flow charts of project development over time. Gantt diagrams. Combustion diagrams. The "slice" principle of the project. Methods of dynamic re-estimation of project time. The concept of risk. Positive and negative risks. Risk identification and analysis. Qualitative and quantitative risk analysis. Risk response strategies.

**Theme № 9. The project cost estimate according to various criteria.**

World practice in project cost estimation. Criteria and features for calculating the cost of an it project. Synchronization of project cost and quality indicators.

**Theme № 10. Methodology project cost management.**

The methods of cost management of the project. Methods for correcting the project cost due to risks. Migration of the project cost. Capitalization of the project cost.

**Theme № 11. Project structuring and documentation development.**

Features of structuring it projects. Version control systems. Documentation and auto-documentation of code. Self-documenting program code. Methods for maintaining reference systems. Documentation of the project. Main types and forms of mandatory documents.

**Theme № 12. Preparation, technical support and management of project parameters.**

Project preparation. Methods of technical support for the project. Methods for calculating project security. Depreciation and obsolescence of equipment. Licenses and expiration of software licenses. Cloud systems and hosting methods. The concept of risk. Positive and negative risks. Risk identification and analysis. Qualitative and quantitative risk analysis. Risk response strategies. The organization's quality policy and the main provisions of quality management. Quality audit and process audit. General methods of the quality control process: cause-and-effect diagram, control diagram, dependency diagram, histogram, Pareto diagram, forecast diagram, scatter diagram, sample estimates, inspection, verification of defects elimination. Testing as a method of quality control of software systems. Types of testing: functional, non-functional, related to changes. Testing of safety, interaction, load, stress, volume, reliability, Assembly, sanitary, installation, smoke, regression, failure and recovery, testing levels: modular, integration, system, acceptance. Cost estimation methods: analogous, determining resource cost rates, bottom-up estimation, parametric estimation, reserves analysis.

**Theme № 13. Quality management of the project.**

The organization's quality policy and the main provisions of quality management. Quality audit and process audit. General methods of the quality control process: cause-and-effect diagram, control diagram, dependency diagram, histogram, Pareto diagram, forecast diagram, scatter diagram, sample estimates, inspection, verification of defects elimination. Testing as a method of quality control of software systems. Types of testing: functional, non-functional, related to changes. Testing of safety, interaction, load, stress, volume, reliability, Assembly, sanitary, installation, smoke, regression, failure and recovery, testing levels: modular, integration, system, acceptance. Cost estimation methods: analogous, determining resource cost rates, bottom-up estimation, parametric estimation, reserves analysis.

**Theme № 14. Methods of analysis of efficiency of execution of an IT project.**

The developed volume method as a tool for analyzing the effectiveness of project execution. Basic indicators of the mastered volume. Derived indicators of the developed volume. Assessment of the current project progress by time frame using the developed volume method. Estimation of the current project progress by cost using the developed volume method. Forecast by time frame at the time of project completion. Cost forecast at the time of project completion

**Theme № 15. Implementation of the project schedule. Time tracking tools for employees.**

Project team and human resource management processes. Distribution of roles and responsibilities, responsibility matrix. Organizational structure of the project. Types of matrix organizations, their features, advantages, disadvantages, and applications (functional, project, weak, strong, and balanced). Placement of employees. Principles of remote work of employees using remote technologies. Plan for providing the project with personnel. Methods of recruitment of the project team. Methods development of the project team. Project communication management processes: communication planning, information dissemination, performance reporting, project participant management.

**Theme № 16. The project management team. Flexible methodologies.**

Project team management methods. Flexible it project management methodologies, it project management systems. Manifesto and principles of agile development as a set of values for agile it project management methodologies. Agile frameworks and their corresponding IT project lifecycle models: Scrum, Lean, Kanban, extreme programming. Advantages and disadvantages of flexible methodologies, scope of application. Task card systems. Modern methods of accounting for employees's work. Methods for keeping records of work cards. Ways to synchronize the team's work using technical tools. Version control systems for software code and project documentation (GitHub, GitLab, Bitbucket).

**Theme № 17. Project management tools.**

Overview of the capabilities of classical project management systems based on the principles of PMB. Modern project management systems. A simple system like Trello. Wrike project Board management system, Asana boards. Comprehensive project management system Jira software. Planning and managing projects using Microsoft Project, PpenProj, Redmine, YouTrack, and Yandex tools.Tracker.

1. **List of intended learning outcomes correlated with competence**

Master’s degrees:

09.04.01 Computer science and engineering

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| --- | --- | --- |
| **Competence** | **Indicators** | **Learning outcomes** |
| UC-2. Able to manage a project at all stages of its life cycle | UC-2.1 Defines the goal and objectives of the project, the resources necessary for its implementation | **Knowledges:**  The content of the project initiation processes, the structure and content of the project Charter.  Methods for identifying project goals and priorities.  **Abilities:**  Evaluate the project resources required for its successful implementation.  **Skills:**  Skills to use and effectively select methods for evaluating project resources necessary for its successful implementation, tools to ensure the viability of the project. |
| UC-2.2 Develops a project implementation plan in accordance with its life cycle | **Knowledges:**  Models and composition of the main stages of the IT project lifecycle and their features. Methods for drawing up a project plan in accordance with its life cycle to achieve the specified project parameters, methods for documenting the project.  **Abilities:**  Draw up a project work plan and a plan for using project resources in accordance with its life cycle to achieve the specified project parameters, and draw up accompanying documentation.  **Skills:**  Skills to implement all methods of project resources planning, including using automated project management systems and specialized tools. |
| UC-2.3 Evaluates and corrects the project implementation process at all stages of the life cycle | **Knowledges:**  Methods for evaluating and correcting the project implementation process at all stages of its life cycle.  Methods for controlling project parameters.  **Abilities:**  Evaluate the current progress of the project and forecast project parameters at the time of its completion.  **Skills:**  Skills to implement all methods of project assessment, control, forecasting, and correction, including using automated project management systems and specialized tools. |
| UC-3. Able to organize and manage the work of the team, developing a team strategy to achieve  set goal | UC-3.1 Develops a team strategy for achieving the goal, plans and manages the team's work,  controls the implementation of the strategy by the team | **Knowledges:**  Methods of planning the organizational structure of the project, providing the project with personnel, developing the project team, managing communications, methods for drawing up team management strategies, methods for evaluating the effectiveness of team management.  **Abilities:**  Plan the work of the team as a whole and an individual employee to achieve the goals of the project, monitor the implementation of the planned strategy by the team.  **Skills:**  Skills to implement all methods for assessing and equalizing the workload of team members, as well as evaluating the effectiveness of its work, including using automated project management systems. |
|  | UC-3.2 Organizes team work using modern business communication technologies and management methods  group solutions | **Knowledges:**  Modern technologies of business communications and methods of managing group decisions, methods of evaluating the effectiveness of decisions made.  **Abilities:**  Use modern information technologies to organize business communications and group work on a project, make group decisions and monitor their implementation.  **Skills:**  Skills in using modern information technologies to organize business communications and group work on a project, as well as ways to control and manage group decisions. |
| CPC-5. Able to manage the development of software tools and projects | CPC-5.1. Analyzes requirements, plans resources and deadlines, and creates technical tasks for development  software tools and projects | **Knowledges:**  Approaches to collecting, analyzing, and documenting requirements for software under development.  Standards for drawing up technical specifications for the development of software systems.  **Abilities:**  Plan resources and deadlines for the project development of software systems, including using automated project management systems and special technical tools.  **Skills:**  Skills in drawing up and documenting technical specifications for developing software systems, tools for planning and managing it projects at the modern level, |
|  | CPC-5.2. Selects the project management methodology, organizes and manages project execution | **Knowledges:**  Types of software project management methodologies and features of their application, modern project management methodologies, methods of project quality assessment.  **Abilities:**  Apply modern project management methodologies, plan resources and deadlines for the project development of software systems, including using automated project management systems.  **Skills:**  Skills to implement tools for managing IT projects and skills in drawing up and documenting technical specifications for developing software systems. |
|  | CPC-5.3. Evaluates the results of project work | **Knowledges:**  Methods for confirming the content of project work on the development of software systems.  **Abilities:**  Evaluate project work based on quality, cost, and time criteria.  **Skills:**  Skills to assess the quality of the results of project work, their compliance with the terms of reference using automated project management systems. |

1. **Additional useful information**

The effectiveness of training increases using modern technical means, technologies and methods of studying the subject. The organization of the training process in the discipline uses both traditional, typical lecture and seminar forms of training, and innovative (interactive, simulation, project) technologies.

**Summative Assessment method:** 2 semester – differentiated credit.