MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
National Aerospace University named by M. Ye. Zhukovsky
"Kharkiv Aviation Institute"

Department of Computer Science and Information Technologies (No. 302)

APPROVED BY

Guarantor of the educational program

Daniil REVENKO

«30» August 2024

SYLLABUS OF THE MANDATORY EDUCATIONAL COMPONENT

Scientific Project Management

Field of Knowledge: 05 Social and Behavioral Sciences

Specialty: 051 Economics

Educational Program: Economics

Higher Education Level: Third (Educational and Scientific)

Mode of Study: Full-time and Part-time

The syllabus is effective from 01.09.2024

Kharkiv – 2024 p.

Developer:

Professor of the Department of Computer Science and
Information Technologies, Doctor of Technical Sciences,
Professor Olga MALYEYEVA



(signature)

The syllabus of the academic discipline was reviewed at a meeting of the Department of Computer Science and Information Technologies of the Faculty of Aircraft Control Systems:

Minutes No. 7 dated « 27 » 08 2024

Head of the Department of Computer Science
and Information Technologies,
Doctor of Technical Sciences, Professor _____ Oleg FEDOROVICH

(signature)

General Information about the Teaching Staff



Full Name: ***Olga Volodymyrivna MALYEYEVA***

Position: *Professor of the Department of Computer Science and Information Technologies*

Academic Degree: *Doctor of Technical Sciences*

Academic Title: *Professor*

E-mail: o.malyeyeva@khai.edu

Courses Taught: *Statistical and Probabilistic Methods of Data Analysis, Optimization of Decisions in Computer Control Systems, Methods and Technologies of Quality and Risk Management in Projects.*

Research Interests: *Project Management, Production Development, Logistics Systems, Mathematical Modeling and Stochastic Processes.*

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Full Name: ***Miroslav Oleksandrovych MOMOT***

Position: *Associate Professor of the Department of Computer Science and Information Technologies*

Academic Degree: *Candidate of Technical Sciences*

Academic Title: *Associate Professor*

E-mail: m.momot@khai.edu

Courses Taught: *Object-Oriented Programming, Modern Programming Technologies, Software Product Development Management, Information Systems Development Methodologies*.

Research Interests: *Information Modeling in the Design and Modernization of Communication and Data Transmission Networks, Information Modeling of Telecommunication Services, Verification Systems and Modeling of Technological Assembly Processes*



Full Name: ***Yuliia Anatoliivna MALIEIEVA***

Position: *Associate Professor of the Department of Computer Science and Information Technologies*

Academic Degree: *Candidate of Technical Sciences*

Academic Title: *Associate Professor*

E-mail: i.bilokin@khai.edu

Courses Taught: *Information Technologies for Corporate Governance and Strategic Management, Geoinformation Technologies in the Management of Complex Systems, Statistical and Probabilistic Methods of Data Analysis, Methods for Research and Optimization of Business Decisions*.

Research Interests: *Project Management, Lifecycle Management of Complex Technical Systems*.

2. Course Description

Mode of Study	Full-time
Semester	Second
Language of Instruction	English
Course Type	Mandatory
Course Workload: ECTS Credits / Number of Hours	4 ECTS credits / 120 hours (64 contact hours, including: lectures – 32 hours, practical classes – 32 hours; independent study – 56 hours)
Types of Learning Activities	Lectures, practical classes, independent study
Types of Assessment	Current assessment, module assessment, final (semester) assessment – examination.
Prerequisites	Processing and Analysis of the Results of Economic Research Using IT (MC1)
Corequisites	Elective Course (Advanced Specialized Knowledge)
Postrequisites	Methodology of Teaching Activity (MC4)

3. Purpose and Objectives of the Course, Lists of Competencies and Expected Learning Outcomes

Purpose – to provide PhD students with modern methods and technologies for managing scientific projects and programs and evaluating their results; to provide a comprehensive understanding of the fundamental principles, categories, models, and tools of project management; to develop knowledge of managing the process of attracting financial resources and other resources (human, material, informational, etc.) that an organization cannot provide independently but are necessary for the implementation of a specific project or its overall activities; to provide knowledge of intellectual property management aimed at identifying the dominant intellectual property object in the strategic planning of enterprise (organization, institution) activities.

Objectives – to train researchers capable of effectively developing, planning, implementing, and completing scientific and technological projects and programs; to prepare specialists for teamwork within project environments, project communications management, project human resource management, and financial flow management under conditions of a changing external project environment.

Competencies Acquired:

Integral Competence:

The ability to generate new ideas, solve complex problems in the field of economics, and conduct independent scientific research whose results possess scientific novelty and theoretical and practical significance, involving a profound

rethinking of existing knowledge and the creation of new integrated knowledge and/or professional practice.

General Competencies (GC)

Upon completion of this program, the student will be able to:

GC01. Demonstrate the ability for abstract thinking, analysis, and synthesis.

GC02. Demonstrate the ability to search for, process, and analyze information from various sources.

GC03. Demonstrate the ability to work in an international context.

GC04. Demonstrate the ability to generate new ideas (creativity).

Specialized Competencies (SC)

Upon completion of this program, the student will be able to:

SC02. Demonstrate the ability to present and discuss the results of scientific research and/or innovative developments orally and in writing in Ukrainian and foreign languages.

SC05. Demonstrate the ability to identify, thoroughly analyze, and solve research problems in the field of economics, taking into account economic risks and potential socio-economic consequences; to assess and ensure the quality of conducted research, including within the framework of international innovation cooperation.

SC07. Demonstrate the ability to initiate, develop, and implement complex innovative research projects in economics and related interdisciplinary fields; to demonstrate leadership and responsibility during their implementation; to commercialize research results and ensure compliance with intellectual property rights.

Program Learning Outcomes (PLOs):

PLO03. Develop and investigate fundamental and applied models of socio-economic processes and systems, and effectively apply them to generate new knowledge and/or create innovative products in economics and related interdisciplinary fields.

PLO04. Apply modern tools and technologies for information retrieval, processing, and analysis, including statistical methods for analyzing large-scale datasets and/or data with complex structures, specialized software, and information systems.

PLO05. Propose new solutions and develop scientific projects that enable the rethinking of existing knowledge and the creation of new integrated knowledge and/or professional practice, as well as the solution of significant fundamental and applied problems in economic science while considering social, economic, environmental, and legal aspects; ensure the commercialization of research results and compliance with intellectual property rights.

PLO11. Demonstrate the ability to manage the scope, schedule, cost, quality, risks, human resources, and communications of scientific and technical projects, including those in the aerospace sector, in accordance with the requirements of international standards.

4. Course Content

Module 1

Content Module 1. Formation and Planning of a Research Project

Topic 1. Introduction to the Course "Research Project Management"

- *Annotation:* The goals, objectives, and significance of research project management in modern conditions are examined. Key approaches, principles, and methods for organizing research activities are identified.
- *Lecture topic:* History of Project Management (PM). Project and the specifics of project-based activities. Research projects.
- *Independent study:* Reviewing lecture materials and preparing questions for the instructor.
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Topic 2. Types of Research Projects. Project Content

- *Annotation:* Classifications of research projects according to scale, duration, and objectives are analyzed. The structure of project content and its main components are explained.
- *Lecture topics:* Types of research projects. Project content. Project scope planning. Fundamental aspects of project management. Project management standards and methodologies.
- *Practical class topics:* Types of research projects. Project objectives and requirements.
- *Independent study:* Completing a home assignment on the following topics: Classification features of a research project. Project content (objectives and requirements).

Topic 3. Project Life Cycle and Processes. Project Risks

- *Annotation:* The stages of the project life cycle, from initiation to completion, are studied. Special attention is paid to risk analysis and risk mitigation methods.
- *Lecture topics:* Project life cycle. Project initiation. Idea generation and project concept development. Project analysis and its structure. Types of project risks. Project risk management. Risk identification. Qualitative and quantitative risk analysis. Planning risk response measures.
- *Practical class topics:* Project risks.
- *Independent study:* Completing a home assignment on the topic: Identification and qualitative analysis of research project risks.

Topic 4. Project Participants and Organizational Structures. Project Stakeholders

- *Annotation:* The roles and functions of participants in a research project are described. Interaction with stakeholders and models of organizational management structures are considered.

- *Lecture topics:* Concept of a project organizational structure. Types of organizational structures for research projects. Definition of functional responsibilities of participants in a scientific and technical project. Value-oriented approach to project management. Stakeholder management.
- *Practical class topics:* Project stakeholders.
- *Independent study:* Completing a home assignment on the topic: Project stakeholder analysis.

Topic 5. Planning and Management of Research Projects in Higher Education Institutions

- *Annotation:* The specifics of project planning in higher education institutions are highlighted. Methods of monitoring and managing project activities in the academic environment are analyzed.
- *Lecture topics:* Specific features of research projects at a university. Research project management system at a university. Project planning processes.
- *Practical class topics:* Research project proposal form.
- *Independent study:* Completing a home assignment on the topic: Research and applied project proposal form (state-funded research).

Module Assessment (Test)

Module 2

Content Module 2. Research Project Execution and Monitoring

Topic 6. Research Project Structuring. Project Schedule Development

- *Annotation:* The methodology of project structuring and the development of a hierarchical task structure are considered. Tools for estimating activity durations and developing project schedules are studied.
- *Lecture topics:* Work Breakdown Structure (WBS). Organizational Breakdown Structure (OBS). Fundamentals of network planning. Activity duration estimation. Critical Path Method (CPM). Program Evaluation and Review Technique (PERT). Critical Chain Method (CCM).
- *Practical class topics:* Project schedule development.
- *Independent study:* Completing a home assignment on the topic: Project Work Breakdown Structure.

Topic 7. Resource and Cost Management of a Research Project

- *Annotation:* Principles of project resource planning, allocation, and control are analyzed. Approaches to cost estimation and management of research activities are explored.
- *Lecture topics:* Project material resource management. Project cost management. Project performance monitoring and control.

- *Practical class topics:* Project schedule optimization with respect to time and cost. Multi-criteria supplier selection.
- *Independent study:* Completing a home assignment on the topic: Resource management.

Topic 8. Human Resource and Communication Management in a Research Project

- *Annotation:* Methods of motivating, coordinating, and ensuring effective teamwork are considered. Communication management models for achieving common project goals are studied.
- *Lecture topics:* Project manager. Project team. Project Management Office (PMO). Essence and content of communication management in a research project. Communication planning: models and methods. Communication management.
- *Practical class topics:* Project team formation.
- *Independent study:* Completing a home assignment on the topic: Research project personnel.

Topic 9. Financing, Quality, and Efficiency of a Research Project

- *Annotation:* Sources of funding and mechanisms for attracting investments to research projects are analyzed. Special attention is paid to quality management and the evaluation of project outcomes.
- *Lecture topics:* Types of research project funding. Quality management methods. Quality planning. Project quality assurance and quality control. Performance indicators of research projects.
- *Practical class topics:* Financial justification of a research project.
- *Independent study:* Completing a home assignment on the topic: Financial justification of a research project.

Module Assessment (Test)

5. Individual Assignments

Not applicable.

6. Teaching Methods

Verbal, visual, and practical methods.

The course is delivered through classroom instruction, individual consultations (when necessary), and students' independent study based on materials published by the department (articles, monographs, dissertations) and other resources, including electronic materials.

7. Assessment Methods

Current assessment (oral questioning), module assessment (tests covering individual course modules), and final semester assessment**:** examination**.**

8. Assessment Criteria and Distribution of Points Awarded to Students

Table 8.1. Distribution of Points Awarded to Students

Components of Academic Work	Points per Activity	Number of Activities	Total Points
Content Module 1			
Participation in practical classes	0…1	8	0…8
Independent assignments (practical component of Module 1)	0…5	5	0…25
Module assessment (test)	0…20	1	0…20
Content Module 2			
Participation in practical classes	0…1	7	0…7
Independent assignments (practical component of Module 2)	0…5	4	0…20
Module assessment (test)	0…31	1	0…20
Усього за семестр			0…100

The semester examination is conducted if a student chooses not to accept the points earned through continuous assessment and is eligible to take the examination (having completed at least three independent assignments). During the semester examination, a student may earn a maximum of 100 points.

The examination paper consists of a theoretical test. For the test (50 questions), a student may receive a maximum of 60 points**.** The points earned for completed practical (independent) assignments (up to 40 points**)** are added to the test score.

Table 8.2. Grading Scale: Point-Based and Traditional

Total Score	Total Score	
	Examination / Differentiated Credit	Credit
90 – 100	Excellent	Passed
75 – 89	Good	
60 – 74	Satisfactory	
0 – 59	Unsatisfactory	Failed

Assessment Criteria for Student Performance During the Semester

Satisfactory (60–74 points). Possess a minimum level of knowledge and skills. Attend at least 20% of lectures and practical classes. Know the fundamental methods of research project management.

Good (75–89 points). Demonstrate solid command of the required knowledge. Attend at least 50% of lectures and practical classes. Understand modern methods of research project management. Be able to prepare project documentation, justify project feasibility, and form a project team.

Excellent (90–100 points). Demonstrate comprehensive knowledge of both core and supplementary materials. Attend at least 80% of lectures and practical classes. Be familiar with textbooks, study guides, and scientific publications. Participate actively in practical classes. Be able to apply modern information technologies in project management. Deliver a presentation on the application of research project management methods within their own dissertation research.

9. Course Policy

Class Attendance. Students who, due to certain circumstances, are unable to attend practical classes on a regular basis must, within one week, agree with the instructor on an individual schedule for making up missed classes. Individual missed classes must be made up during the nearest consultation session within one week after the absence.

Compliance with Academic Integrity Requirements. While studying the course, students must adhere to generally accepted ethical standards and rules of conduct, as well as the principles of academic integrity established by the Academic Integrity Regulations of the National Aerospace University named by M. Ye. Zhukovsky "Kharkiv Aviation Institute" **(**https://khai.edu/assets/files/polozhennya/polozhennya-pro-akademichnu-dobrochesnist.pdf).

Conflict Resolution. The procedures and mechanisms for resolving conflicts related to corruption, conflicts of interest, various forms of discrimination, sexual harassment, interpersonal relationships, and other situations that may arise during the educational process, as well as the rules of ethical conduct, are governed by the Code of Ethical Conduct of the National Aerospace University named by M. Ye. Zhukovsky "Kharkiv Aviation Institute" **(**https://khai.edu/ua/university/normativna-baza/ustanovchi-dokumenti/kodeks-etichnoi-povedinki/).

10. Methodological Support

1. Information Technologies of Corporate Management and Strategic Management: Study Guide for Laboratory Practice / Yu. A. Malyeyeva, O. V. Malyeyeva. Kharkiv: National Aerospace University "Kharkiv Aviation Institute", 2020. 40 p.

2. Malyeyeva O.V., Nosova N.Yu., Artyuch R.V. Models and Methods of Managing the Professional Level of Internal Project Participants. In: *Information Systems and Innovative Technologies in Project and Program Management*.

Collective monograph edited by I. Lindle, I. Chumachenko, V. Timofeyev. Riga, 2019. Pp. 35–47. ISBN 978-9984-891-08-8.

3. Lytvynenko D., Malyeyeva O. Comprehensive Method for Balancing and Harmonizing Stakeholder Interests in Transport System Development Projects. *Current State of Scientific Research and Technologies in Industry*, 2019, No. 3 (9), pp. 91–98. DOI: https://doi.org/10.30837/2522-9818.2019.9.091.

4. Lytvynenko D., Malyeyeva O. Risk Management in Projects for Restoring Regional Transport Infrastructure Based on Participants' Communication. *Innovative Technologies and Scientific Solutions for Industries*, No. 2 (20), 2022. Pp. 44–51. DOI: https://doi.org/10.30837/ITSSI.2022.20.044.

5. Malyeyeva Olga, Malieieva Yulia, Kosenko Viktor, Artiukh Roman. Formalized Models of Processes and Optimization of Indicators for Complex Equipment Recycling Projects. *15th International Scientific and Technical Conference on Computer Sciences and Information Technologies (CSIT 2020)*, 2021. DOI: 10.1109/PICST51311.2020.9467933.

6. Bilokin Yu.A. System Representation of the Life Cycle of Complex Equipment Considering the Disposal Stage. *Systems of Arms and Military Equipment*, 2010, No. 2 (22), pp. 99–103.

7. Fedorovych O.Ye., Malyeyeva O.V., Yelyzyeva A.V. Information Support for Supply Logistics of a Manufacturing Enterprise: Study Guide. Kharkiv: National Aerospace University "Kharkiv Aviation Institute", 2015. 100 p.

8. Malyeyeva O., Nosova N., Fedorovych O., Kosenko V. The Semantic Network Creation for an Innovative Project Scope as a Part of Project Knowledge Ontology. *CEUR Workshop Proceedings*, Vol. 2362, 2019. Available at: http://ceur-ws.org/Vol-2362/paper27.pdf

9. Lytvynenko D.P., Malyeyeva O.V., Yelyzyeva A.V. Blockchain Technologies in Communication Management of Infrastructure Projects. *Radioelectronic and Computer Systems*, 2021, No. 3 (99), pp. 169–181. DOI: https://doi.org/10.32620/reks.2021.3.14.

10. Malyeyeva O.V., Yurkevych A.Yu. Statistical Data Analysis (Using the STATISTICA 10.0 Software Package): Methodological Guide. Kharkiv: National Aerospace University "Kharkiv Aviation Institute", 2018. 48 p.

11. Recommended Literature

Basic Literature

1. Verba V.A., Zahorodnikh O.A. *Project Analysis*. Textbook. Kyiv: KM Academy, 2000. 322 p.

2. Dovhan L.Ye., Mokhonko H.A., Malyk I.P. *Project Management*. 2017.

3. Chumachenko I.V., Morozov V.V., Dotsenko N.V., Cherednychenko A.M. *Project Management: Project Action Planning Processes*. Textbook. Kyiv: KROK, 2014. 673 p.

4. Duncan William R. *Guide to Project Management*, edited by S.D. Bushuyev. 2nd revised edition. Kyiv: Institute of Management and Business, 2014. 197 p.

5. Malyi V.V., Mazurkevych O.I., Chernov S.K., Antonenko S.V., Zavhorodnii M.S. *Elements of Enterprise Project Management*. Textbook. Dnipro: IMA-Press, 2011. 159 p.
6. Tarasiuk H.M. *Project Management: A Study Guide for Higher Education Students*. Kyiv: Karavela, 2004. 344 p.

Supplementary Literature

1. A Guide to the Project Management Body of Knowledge (PMBOK Guide), edited by Prof. S.D. Bushuyev. Kyiv: Dilova Ukraina, 2000. 198 p.
2. Dictionary-Handbook of Project Management, compiled by S.D. Bushuyev. Kyiv: Dilova Ukraina Publishing House, 2001. 640 p.

Information Resources

1. University Scientific and Technical Library Website. Available at: http://library.khai.edu
2. Mentor Distance Learning System Website. Available at: https://mentor.khai.edu/course/view.php?id=7531
3. POMQM5 Software Package. Available at: https://drive.google.com/file/d/1SpzIE8z7BbrRrsu0H4PO42_hyFXOa_Vs/view
4. On Amendments to the List of Fields of Knowledge and Specialties for Higher and Professional Pre-Higher Education. Available at: https://zakon.rada.gov.ua/laws/show/1021-2024-п#Text
5. Law of Ukraine “On Science Parks”. Available at: http://search.ligazakon.ua/l_doc2.nsf/link1/T091563.html