Ukrainian State University of Railway Transport

APPROVED

Minutes of the meeting of the Department of

Specialized Computer Systems

August 25, 2025 No. 1

SYLLABUS FOR THE DISCIPLINE

INTELLECTUAL COMPUTER DECISION SUPPORT SYSTEMS

Second semester of the 2025-2026 academic year and First semester

of the 2026-2027 academic year

Higher education level:	first (educational and scientific)
Higher education degree:	bachelor
Specialty:	123 Computer Engineering
Educational program:	Specialized Computer Systems
Scope:	6 ECTS credits
Number of modules:	2 (4 content modules) 4, 5 semesters
Reporting:	Test/exam

Lecturer: Dotsenko Sergey Ilyich Doctor of Technical Sciences, Associate Professor

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Hours of reception and consultations: 13.00-14.00 Tuesday - Thursday

Location of the department: City of Kharkiv, Feuerbach Square, 7, 3rd building, 4th floor, 434 auditorium

Course web page: http://do.kart.edu.ua/

Additional information materials: http://metod.kart.edu.ua

PLANNED LEARNING OUTCOMES

Teaching the academic discipline "Intelligent Computer Decision Support Systems" consists in preparing students to participate in the development, design, construction and operation of intelligent information systems in railway transport.

The task of studying the discipline "Intelligent Computer Decision Support Systems" is: applying the theory of intelligent cybernetic systems in the development of dialogic production management systems for separate divisions of PJSC "UKRZALIZNYTSYA".

8 credits / 240 ECTS hours are allocated for studying the academic discipline.

Why should you choose this course?

If you are interested in the problems of developing and implementing modern computer systems for train traffic control, control systems for responsible processes and production of state importance in the future, if you want to get an interesting and highly paid job in Ukraine and abroad, where in recent years there has been a very high demand for specialists in information systems and technologies, then this is the course you need!

Applicants are expected to have: a basic understanding of physics, mathematics, the basics of programming computer systems and controllers, knowledge of the basics of circuit engineering, methods for building computer system architecture, as well as awareness of issues of analyzing technical and software solutions.

The course content is devoted to the issues of developing dialogic systems for managing production units based on the theory of intelligent cybernetic systems, which is a further development of the theory of classical cybernetic systems. For this purpose, each applicant develops his own automated workplaces during practical classes, the architecture model of which is based on the open architecture of the knowledge model. This ensures the acquisition of skills in the scientific organization of labor by the applicant at the stage of his studies.

The team of teachers and our colleagues-producers will be ready to provide any assistance with the most complex aspects of the course by e-mail and in person - during working hours.

Course Overview

The course is studied over two semesters and provides students with a deep understanding of the problems of building and developing intelligent cybernetic systems that

arise at the first stages of the information systems life cycle and ways to solve them, and provides a reliable basis for rapid adaptation at the first workplace when employed in production in Ukraine or in countries near and far abroad.

The course consists of one lecture per week and one practical lesson for two weeks. It is accompanied by text material, presentations, group and individual tasks. Students will have the opportunity to apply the knowledge gained and solve practical tasks during discussions in the classroom and the development of their own projects "ARM - Library", "ARM - Educational Activities". The course includes lectures by invited employers (specialists of Radio Information Systems LLC, INSOLAR-CLIMAT LLC).

Practical classes of the course involve mastering methods and tools for developing knowledge bases, as well as developing projects for one's own knowledge bases: knowledge bases, "ARM - Library", "ARM - Educational Activities". The completion of tasks is accompanied by immersion in related disciplines that complement the topics and form the student's information and communication competence.

Course resources

Information about the course is posted on the University website in the "distance learning" section along with questions that need to be considered during preparation for discussion in the classroom. The necessary preparation must be completed before the start of the next lecture. During the discussion, we will invite you to critically reflect and analyze known technical solutions of systems used in Ukraine and European countries for the needs of railway transport. You should be ready for discussions and brainstorming - we want to know your opinion on the following questions.!

Examples of questions for discussion are available on the slides of the relevant presentations. Here are some of them:

1. Describe the current understanding of the purpose of introducing

intelligent computer systems for railway transport and industry in general.

2. What tasks are set in the Strategy for the Digitalization of Industry in Ukraine (for the Industry 4.0 concept)?

3. What tasks are set when introducing the Industry 5.0 concept (Internet of Knowledge)?

4. Explain the role of intelligent systems in the development of information systems and technologies.

5. Using the example of specific systems, show the principles of developing intelligent systems.

6. What role do you think the human operator plays in railway automation systems, the causes of dangerous actions of personnel, the principles of securing critical human-machine systems.

Course Topics

MODULE 1 THEORETICAL BASIS OF COMPUTER DECISION SUPPORT SYSTEMS

Lecture 1. THE CONCEPT OF DECISION SUPPORT SYSTEMS

Lecture 2. OBJECTIVES OF DECISION SUPPORT SYSTEMS AND COMPETITIVE ADVANTAGES OF APPLICATION

Lecture 3. RETROSPECTIVE ANALYSIS OF THE EVOLUTION OF INFORMATION TECHNOLOGIES AND INFORMATION SYSTEMS

Lecture 4 ORGANIZATIONAL AND TECHNOLOGICAL PRINCIPLES OF DECISION MAKING. DECISIONS IN ORGANIZATIONAL MANAGEMENT

Lecture 5. SYSTEMIC AND SITUATIONAL APPROACHES TO MANAGEMENT DECISIONS.

Lecture 6. MANAGEMENT DECISION SUPPORT MODELS

Lecture 7. DEVELOPMENT AND IMPLEMENTATION OF DECISION-MAKING SYSTEMS. STRUCTURE AND GENERAL CHARACTERISTICS OF DECISION-MAKING SYSTEMS

Lecture 8. AREAS AND EXAMPLES OF APPLICATION OF DECISION-MAKING SYSTEMS

Lecture 9. BASIC COMPONENTS OF DECISION-MAKING SYSTEMS: ARCHITECTURE AND USER INTERFACE

Lecture 10. BASIC COMPONENTS OF DECISION-MAKING SYSTEMS: DATABASE AND DATABASE MANAGEMENT SYSTEM IN DECISION-MAKING SYSTEMS

MODULE 2 ELEMENTS OF METHODOLOGY FOR DEVELOPMENT OF COMPUTER DECISION SUPPORT SYSTEMS

Lecture 11. BASIC COMPONENTS OF DECISION-MAKING SYSTEMS: MODEL BASES AND MODEL BASES MANAGEMENT SYSTEMS IN DECISION-MAKING SYSTEMS

Lecture 12 CLASSIFICATION OF DECISION-MAKING SYSTEMS: CONCEPTUAL BASIS OF CLASSIFICATION

Lecture 13 CLASSIFICATION OF DECISION-MAKING SYSTEMS: CLASSIFICATION GROUPS AND MODELS OF DSS

Lecture 14 STRATEGY FOR EVALUATION AND SELECTION OF DECISION-MAKING METHODS: METHODOLOGICAL BASIS OF DSS

Lecture 15 STRATEGY FOR EVALUATION AND SELECTION OF DECISION-MAKING METHODS: METHODS OF EVALUATION OF DSS SOFTWARE

Lecture 16. “SCHOOLS” OF DSS CREATION

Lecture 17. DSS DESIGN AND RE-ENGINEERING BUSINESS PROCESSES

Lecture 18. IMPLEMENTATION AND EVALUATION

INTERDISCIPLINARY RELATIONS

The discipline is based on the main provisions of the disciplines:

Higher mathematics

Physics

Engineering and computer graphics

Computer control systems

The discipline is the basis for the study of disciplines:

Software engineering

Computer systems for collecting and processing technological information

Technology and automation of device and computer systems design.

PROGRAM LEARNING OUTCOMES

After studying this course, the applicant will be able to:

RN 1. The ability to demonstrate a systematic understanding of professional knowledge when planning and forecasting the functioning of highly intelligent productions associated with the industrial revolution 4.0. by conducting research and calculating their main technical and economic indicators based on analysis data and technical documentation.

RN 7. The ability to apply knowledge and understanding of the possibilities of developing and implementing a flexible strategy for the development of industrial automation systems based on the theory of dialogic control systems.

RN 14. The ability to have skills in working with applied software packages for automated design and research of intelligent systems, to use information technologies to solve practical problems in the field of professional activity.

EVALUATION RULES

When filling in the student's test report and test book (individual curriculum), the grade set on a 100-point scale must be transferred to the state scale (5, 4, 3,) and ECTS scale (A, B, C, D , IS)/

Determination of the name on the state scale (assessment)	Determination of the name on the ECT scales	**On a 100-point scale**	**ECTS rating**
EXCELLENT - 5	Excellent - excellent performance with only a small number of errors	90-100	A
GOOD - 4	Very good - above average with a few errors	82-89	B
	Good - in general, the right work with a number of gross errors	75-81	C
SATISFACTORY - 3	Satisfactory - not bad, but with many shortcomings	69-74	D
	Enough - the performance meets the minimum criteria	60-68	E
Unsatisfactory - 2	Unsatisfactory - you need to work before getting a test or exam (without re-studying the module)	35-59	FX
	Unsatisfactory - serious further work required (re-study of the module)	<35	P

Dotsenko Serhiy Ilyich (https://kart.edu.ua/staff/docenko-sergij-illich) - lecturer in computer systems and information technology. He received a degree in Ph.D. in specialty 05.13.06 information technology in 2017 at KhNUMG. OHM. Бекетова. Areas of research: cybernetic systems, intelligent information technology, security of computer systems.

Code of Academic Integrity

Violation of the Code of Academic Integrity of the Ukrainian State University of Railway Transport is a serious violation, even if it is unintentional. The Code is available at: http://kart.edu.ua/documentu-zvo-ua

In particular, compliance with the UkrDUZT Code of Academic Integrity means that all work on exams and tests must be performed individually. While working independently, students can consult with teachers and other students, but must solve problems on their own,

guided by their own knowledge, skills and abilities. References to all resources and sources (for example, in reports, independent papers or presentations) should be clearly identified and properly documented. In the case of working together with other students on individual tasks, you should indicate the degree of their involvement in the work.

Integration of students with disabilities

Higher education is a leading factor in raising social status, achieving spiritual, material independence and socialization of young people with disabilities and reflects the state of development of democratic processes and humanization of society.

To integrate students with disabilities into the educational process of the Ukrainian State University of Railway Transport, a distance learning system based on modern pedagogical, information and telecommunication technologies has been created.

Access to distance learning materials from this course can be found at: http://do.kart.edu.ua/