Ukrainian State University of Railway Transport

Recommended
at the meeting of the department
specialized computer systems
protocol № 1 dated 25.06.2025
Head of the SKS department
Moiseyenko V.I.

SYLLABUS OF THE DISCIPLINE

TECHNOLOGICAL PROCESSES IN RAILWAY TRANSPORT

2025-2026 academic year

First level of education (bachelor's degree)

Field of knowledge F Information technologies

Specialty F7 Computer engineering

Educational program; specialized computer systems

Time and audience of classes: according to the schedule -http://rasp.kart.edu.ua/.

TEAM OF TEACHERS

Lecturer assistants: Volodymyr Mykhailovych Butenko *38 (057) 730-10-62*, e-mail:**butenko@kart.edu.ua** Vitaly Viktorovych Gaevskii (Director of NVP ZALIZNYCHAVTOMATIKA LLC, recipient of the department) gaevskijv54@gmail.com **Reception and consultation hours:**13.00-14.00 Tuesday - Thursday
Web pages of the course: http:// kart.edu.ua/kafelra-sks-ua/pro-kafelru-sks-ua Additional information materials: http:// metod. kart.edu.ua

Kharkiv 2025

The subject of study of the academic discipline is:processes of railway transport system functioning,the main categories and concepts of modern information and management technologies of railway activity, and informational aspects of the transportation process.

The discipline "Technological processes in railway transport" is the basis for further study of professional disciplines and successful adaptation of a young specialist in production. It gives an idea of the foundations of the construction and technological processes of the functioning of the components of the railway transport system, the principles of construction of information and control systems in railway transport, the peculiarities of the organization of the railway complex, the foundations of the construction of railway automation systems and safety of transportation.

The course aims to form and develop the following competencies of students:

Program learning outcomes

Planned general competencies (ZK), special professional competencies (SPK), learning outcomes (N):

-ZK.10 the ability to formulate tasks and solve problems in the railway transport industry based on knowledge about innovative ways of developing the industry in the Industry 4.0 concept;

-SPK8 the ability to apply knowledge of the principles, methods and means of designing, building and maintaining modern computer networks of various types and purposes, including for the needs of railway transport;

-N9 to be able to apply knowledge of technical characteristics, design features, purpose and rules of operation of software and technical means of computer systems and networks to solve technical problems of the specialty;

-N10 to be able to develop software for embedded and distributed applications, mobile and hybrid systems, calculate, operate equipment typical for the specialty.

Why should you choose this course?

The work of a modern programmer who deals with automation problems is based on two main components: the ability to program and knowledge and understanding of the work technologies of a specific industry.

As for programming, there are no problems here, dozens of educational institutions are at your service, which will help you learn the necessary programming language. It is more difficult to deal with the technology of the required industry. It is possible to learn this on your own if you work for a long time and gain the necessary experience and knowledge, but this requires a lot of time, which you do not have.

This problem can be solved quite easily and effectively if you choose this course, in which experienced teachers will provide the necessary knowledge and skills that will be needed when studying professional disciplines, writing a final thesis, and of course, this course is needed in production!

The teaching team and our production colleagues will be ready to provide any help with the most difficult aspects of the course by emailand personally - during working hours.

Course overview

The discipline "Technological processes in railway transport" is the basis for further study of professional disciplines and performance of qualification work.

The course is studied during one semester and gives students a deep understanding of the technologies of the railway transport system, and provides a reliable basis for quick adaptation in 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 session per two weeks. It is accompanied by text material, presentations and group tasks. Students will have the opportunity to apply the acquired knowledge and solve practical tasks during classroom discussions and project development on alternative and renewable energy for electric transport. The course includes lectures by invited employers (specialists of railway transport enterprises, NVP LLC Zaliznychavtomatika, on issues of railway technology, implementation of modern computer systems for controlling the movement of trains) and a tour of the production.

Course outline

TECHNOLOGICAL PROCESSES IN RAILWAY TRANSPORT

Think about it	Lectures	
	Invited lecturers	
	Reference material	
	Presentations	
	Discussion in the audience	**execute**
	Practical tasks	
	Excursions	
	Individual consultations	
	Test	

The practical lessons of the course involve the study of train management technologies, familiarization with the principles of construction and operation of the traffic control system. The performance of the tasks is accompanied by examples of the work of individual industries and technical means, a demonstration of layouts and samples of equipment, which allows for a visual explanation of theoretical issues.

Course resources

Information about the course is posted on the University's website in the "distance learning" section, along with questions to consider when preparing for a classroom discussion. Necessary preparation must be completed before the start of the next lecture. During the discussion, we will invite you to think critically and analyze certain problematic situations in the process 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 respective presentations.

Here are some of them:

1. Using the example of the website of a separate railway service, analyze its structure, determine the tasks of individual divisions and line enterprises.
2. Determine the main train and shunting routes for a given station, give examples of enemy routes.
3. How to take the train to the station if the entrance traffic light does not open? Determine the method by which the train will be delayed the least.
4. Consider how the technologies of passenger and sorting stations are fundamentally different.
5. Develop proposals for improving the information and other services of the station and the passenger car.
6. For a given section, determine the technical means of automation, show how it is possible to increase throughput and traffic safety.

Course topics

Module 1Technological processes of railway transport
Railwaytransport as a component of the transport system of Ukraine
Basic information about operational work of railway transport
The main technological mechanisms of the transportation industry
Technologies of cargo, commercial and passenger work
Module 2Information and control systems and information technologies in railway transport.
Information technologies in railway transport.
Modern electronic and network services in the railway transport of Ukraine.
Characteristic of rolling stock and station traffic control systems.
Technical means of automation on sorting slides and Dispatching control systems.

INTERDISCIPLINARY CONNECTIONS

The discipline provides the necessary basic foundation for the study of professional disciplines, implementation of course projects and qualification work upon completion of theoretical studies.

Lectures and practical classes

The list of the main lectures of the course is given below.
Watch for schedule changes.

Week	Lectures		Practical (laboratory) classes				
	HOUR	Topic and content		Topic and content	lr	pz	
Technological processes onrailway transport							
1	2	**Topic 1.**Introduction. Railwaytransport as a component of the transport system of Ukraine	2	**P.Z. 1**.. Organization of train movement in races.			
2	2	**Topic2**.Organizational structure of railway transport					
3	2	**Topic3**.Principles of operational work of railway transport	2	**P.Z.2**. Organization of train movement at stations.			
4	2	**Topic 4.**Organization of train work, schedule of trains.					
5	2	**Topic 5.**Organization of shunting work, technologies for its implementation.	2	**P.Z.3**.Organization of train movement at stations.			
6	2	**Topic 6.**Dispatch control technologies					
7	2	**Topic 7.**Technologies of cargo and commercial work at the modern stage	2	**P.Z. 4**. Railway automation technologies: locomotive safety systems.			
8	2	**Modular control**		**Modular control**			
9	2	**Topic 8**Characteristics and technologies of the passenger economy of Ukrzaliznytsia.	2	**P.Z. 5.**Technologies of operation of overdraft blocking systems.			
10		**Topic 9.**Information technologies in railway transport					
11	2	**Topic 10.**The use of Internet services in the operation of railway transport.	2	**P.3.6.**Technologies of operation of station centralization systems.			

12	2	**Topic 12.**Stationary train traffic control systems					
13	2	**Topic 13.**Overrunning train traffic control systems	2	**P.Z**. 7 Technologies of operation of locomotive signaling devices.			
14	2	**Topic 14.** Systems of slide automation.					
15	2	**Topic 15.**Systems and technical means of dispatch control	2	**P.Z**. 8. Practical training in production: design and maintenance of railway automation systems.			
		Modular control		**Modular control**			

Evaluation rules

When filling out the credit and examination information and credit book (individual study plan) of the student, the grade given on a 100-point scale must be transferred to the national scale (5, 4, 3,) and the ECTS scale (A, B, C, D , IS)

Determination of the name according to the state scale (estimate)	Determination of the title according to the ECTS scale	On a 100-point scale	ECTS rating
EXCELLENT - 5	**Perfectly**– excellent performance with only a small number of errors	90-100	A
GOOD - 4	**Very good**– above average level with few errors	82-89	B
	Fine- generally correct work with a certain number of gross errors	75-81	C
SATISFACTORY - 3	**Satisfactorily**- not bad, but with a significant number of shortcomings	69-74	D
	Enough– performance meets the minimum criteria	60-68	E
UNSATISFACTORY - 2	**Unsatisfactorily**– you need to work before getting credit (without re-studying the module)	35-59	FX

	Unsatisfactorily- serious further work is required (re-study of the module)	<35	F

Tasks for independent work of a creative nature:

- Students are invited to choose one of 6 topic options to conduct their own research during the semester. Up to 10 points can be added to the current module control for timely and accurate completion of the master's task. Points are not awarded for an uncompleted task. The required scope of the task is 50% for the first modular control and 100% for the second modular control. The course of the current performance of the task and formation of questions for discussion is carried out by the teacher in a practical session
- Students can review one student development during the semester and express their critical remarks during practical classes
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	Topics of individual creative works
1	Problems of reforming railway transport of Ukraine
2	Development of railway communication in the countries of the European Union
3	Development of high-speed traffic in Ukraine
4	Directions of digitalization of railway infrastructure and technology
5	State of implementation of new electronic services in railway transport
6	Modernization of technical means of train traffic control systems

Student activity at lectures

. 1 point is awarded for activity during lectures. The maximum amount is 8 points. Points for this component are not awarded at all, if the student did not attend more than 50% of the lectures in the module without valid reasons

Degree of involvement:

The purpose of participating in the course is to engage you in the discussion, expand the learning opportunities for yourself and your peers, and give you another way to test your views on the issue of using modern renewable sources for power supply of railway transport. Participation will be scored based on the number and accuracy of your responses. Questions, although encouraged, are not graded in this unit. We strive to provide all students with equal and fair opportunities to increase their own involvement. The maximum amount is 12 points.

Practical training

1 point is awarded for active work at a practical session (up to 15 points), the degree of involvement (up to 10 points) and a concise presentation of the completed task (up to 5 points), work at an off-site practical session at the factory and the subsequent analysis are assessed up to 10 points. The degree of involvement is determined by participation in discussions.

The maximum amount is 40 points.

Test

- The student receives a credit based on the results of the modular 1st and 2nd control by accumulating points. The maximum number of points a student can get is 100 (up to 60 points of current control and up to 40 points of testing). The arithmetic mean of the sum of the module grades is the credit score. If the student does not agree with the proposed points, he can raise them on the test by answering the teacher's questions.

Excursions

During the semester, an excursion to railway transport enterprises is planned for visual familiarization with modern onesmicroprocessor system

Based on the results of the excursions, the student is invited to make a short report that will be evaluated with additional points. The maximum amount is 10 points, they are counted in points for practical classes.

Lectures missed by the student are studied independently according to the topic and provided by the teacher before the start of literature classes.

To make up for missed practical classes, the student must contact the teacher and receive the appropriate assignment.

Teaching team:

Valentin Ivanovich Moiseyenko (kart.edu.ua/kafelra-sks-ua/pro-kafelru-sks-ua)- lecturer, professor of the department of specialized computer systems. Received the degree of Doctor of Technical Sciences. by specialty 05.22.20 operation and repair of means of transport in 2011 at UkrDUZT. Areas of scientific activity: microprocessor-based train traffic control systems.

Volodymyr Mykhailovych Butenko (butenko@kart.edu.ua) is an associate professor of the department of specialized computer systems. Received the degree of Ph.D. by specialty 05.01.02 standardization and certification in 2004 at KNUTD. Areas of scientific activity: microprocessor-based train traffic control systems.

Vitaliy Viktorovych Gaevskij (gaevskijv54@gmail.com) is the executive director of NVP ZALIZNYCHAVTOMATIKA LLC. He received a master's degree in the specialty "electrical systems and complexes of vehicles" in 2017, and in 2021 he received a scientific degree of candidate of technical sciences. The circle of scientific interests is the development of microprocessor-based train traffic control systems and traffic safety.

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 the following link:**http://kart.edu.ua/documentu-zvo-ua**

In particular, compliance with the Code of Academic Integrity of UkrDUZT means that all work on exams and tests must be done individually. During independent work, students can consult with teachers and other students, but must solve tasks independently, guided by their own knowledge, abilities and skills. References to all resources and sources (for example, in reports, independent papers or presentations) should be clearly identified and properly formatted. In the case of joint work 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 and material independence and socialization of youth with limited functional capabilities 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 was createdon the basis of modern pedagogical, information, and telecommunication technologies.

Access to distance learning materials from this course can be found at the following link:**kart.edu.ua/kafelra-sks-ua/pro-kafelru-sks-ua**