

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
State Higher Education Institution “Priazovsky State Technical University”
Faculty of Transport Technologies
Department of Technology of International Transportation and Logistics

APPROVED:
Dean of the Faculty
of Transportation Technology
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« ____ » _____ 2020

PROGRAM OF THE EDUCATIONAL DISCIPLINE

**INFORMATIONAL-ANALYTIC AND DIAGNOSTICS FOR SOCIOTECHNICAL
SYSTEM**

(code and name of the discipline)

To obtain an educational degree: Master’s degree in transport technology

Specialty 275 «Transport Technologies (by species)»
(code and name of the specialty)

Specialization 275.03 «Transport Technologies (Automobile Transport)»
(code and name)

Educational Program «Crisis and risk engineering for transport services»
(name)



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The working program was approved at a meeting of Department of Technology of International Transportation and Logistics

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Approved by the Scientific Council of the Higher Educational Institution "PSTU"

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INTRODUCTION

Mode of study	ECTS credits	Hours	Classroom hours				Independent work	Semester distribution			
			Total	Lectures	Practical	Laboratory		Exams	Credits	Course works	Course projects
Full-time	5	150	48	32	16		102	10			

Curriculum Study Program “Informational-Analytic and Diagnostics for Sociotechnical System (IADSS)” compiled in accordance with the educational and professional training program for applicants secondary (master's) level of higher education in the specialty (specialization): specialty 275 «Transport Technologies (by species)»; specialization 275.03 «Transport Technologies (Automobile Transport)»; educational program «Crisis and risk engineering for transport services»

The subject of entrance requirements for studying the subject "IADSS" is the presence of competencies formed at the previous level of education and directly related to the disciplines of the professional cycle (foundations of the theory of systems and management, research of operations in transport systems). The knowledge gained as a result of mastering the IADSS discipline will help to gain knowledge in the field of ensuring the intensive development and dissemination of information and communication technologies, which accompany the formation of socio-technical systems of various scales and purposes, which are the basis for the functioning of industrial and socio-economic complexes at the present time stage of development. information society. The accelerated development of the element base of modern information systems, socio-technical methodologies that provide approaches to the analysis of production activities and social processes and requires a specialist to practically master advanced methods and means of socio-technical systems, taking into account the peculiarities of interaction between man and technology. The tasks of mastering the discipline: acquiring new knowledge using modern information technologies; planning and organization of activities, interaction, management; the formation of skills in the development, promotion and assessment of socio-technical systems; study of models of socio-technical systems, their structural and functional organization of mastering methods of analysis and evaluation of the functioning of social networks as software services, etc.

Interdisciplinary Relations.

Previous disciplines: Socio-technical methodologies; information and communication technology.

Disciplines provided: Simulation of complex transport processes and systems that operate in conditions of risks.

The course program consists of the following content modules:

Content module 1.

Content module 2.

1. The goals and objectives of the discipline

1.1. The purpose of teaching the discipline: the formation of students' ideas about the current level of development of socio-technical systems, including social networks and the Internet, as well as students mastering a set of professional competencies in analysis, diagnosis and management of socio-technical systems in accordance with general and special training. specialty "Transport technologies by types", the curriculum and qualification characteristics of the master of transport technologies, professional tasks that are solved by specialists in this specialty.

1.2. The main tasks of studying the discipline of the: “Informational-Analytic and Diagnostics for Sociotechnical System (IADSS)” is:

- acquisition of new knowledge using modern information technologies;
- planning and organization of activities, interaction, management; formation of skills in the development, promotion and evaluation of socio-technical systems;
- study of models of socio-technical systems, their structural and functional organization of mastering the methods of analysis and evaluation of the functioning of social networks as software services.

1.3. As a result of studying the academic discipline “Informational-Analytic and Diagnostics for Sociotechnical System (IADSS)” the following academic competencies are formed:

- ability to apply basic scientific and theoretical knowledge to solve theoretical and practical problems in the field of transport technologies;
- possession of systematic and comparative analysis;
- ability to work independently;
- ability to generate new ideas (have critical thinking);
- possession of an interdisciplinary approach to solving problems;
- possession of skills related to the use of technical devices, information management and computer operation;
- mastery of oral and written communication skills;
- the ability to learn, improve their skills throughout life;
- possession of basic methods, methods and means of obtaining storage, information processing using computer technology;
- ability to organize their work on a scientific basis, to independently evaluate the results of their activities.

Socio-personal competencies:

- ability to criticize and self-criticism;
- ability to work in a corporate SCRUM team.

Professional competencies:

- ability to develop, install and maintain system and application software necessary for control and management of transport processes;
- ability to analyze and justify the choice of hardware, software and systems for automated support of professional processes;

- ability to interact with specialists of related profiles; - ability to analyze and evaluate the collected data;
- ability to use global information resources.

As a result of studying the discipline the student must:

Know:

- characteristics and technologies of socio-technical systems;
- structural organization and functioning of socio-technical systems;
- patterns of education, evolution and degradation of social networks and the Internet;
- models of socio-technical systems, including social networks and the Internet;
- the role and functioning of people and groups in socio-technical networks;
- features of socio-engineering attacks;
- principles and methods of search engine optimization;
- methods and technologies of search marketing;
- principles of creating the promotion of social networks;
- modeling of industrial enterprises as socio-technical systems;

Be able:

- to distribute functions between the person and socio-technical system;
- to develop engineering and technical requirements for the design of information socio-technical systems;
- to analyze the structure and functional organization of socio-technical systems for various purposes;
- perform engineering and psychological assessment of the functional and structural organization of socio-technical systems;
- to carry out engineering and psychological analysis of the role of the human factor in socio-technical systems;
- apply search engine optimization methods in practice;
- create and promote social networks;
- perform engineering and psychological assessment and design of software and hardware;
- to characterize modern means of socio-technical systems;
- to develop business plans for the creation of new technologies in the field of informatics and radio electronics;

Have:

- ideas about the structure of socio-technical systems, including social networks and the Internet, tools and methods of managing them;
- methods of analysis and evaluation of the functioning of social networks as software services that form platforms for interaction of people in online communities of different scales;
- methods of analysis of threats to users and personnel of information socio-technical systems during socio-engineering attacks in the conditions of information influence and confrontation.

The course takes 150 hours 5 of ECTS credits.

2. Information volume of the discipline

Content module 1.

Topic 1. General characteristics of socio-technical systems

List of questions on topic 1:

1. Characteristics of components and structure of socio-technical systems;
2. Differences of socio-technical systems from technical systems.

Topic 2. Environmental and social security in the functioning of man and technology in socio-technical systems

List of questions on topic 2:

1. Man in socio-technical systems;
2. Human qualification in socio-technical systems;
3. Technology in socio-technical systems.
4. Ecological safety of functioning of social and technical systems;
5. Social security in "man-machine" systems.

Topic 3. The process of developing management decisions and structuring the goal in socio-technical systems

List of questions on topic 3:

1. Pyramid of strategies in the management of socio-technical systems;
2. Principles of structuring and setting the task of formulating a common goal in socio-technical systems;
3. Implementation of the law of necessity of diversity (Ashby Law) in the management of socio-technical systems;
4. Implementation of the principles of the "black box" in the management of socio-technical systems;
5. Implementation of the concept of "goal tree" in the management of socio-technical systems;
6. Implementation of expert assessments of Delphi and Saati in the management of socio-technical systems.

Topic 4. Information logistics of socio-technical systems

List of questions on topic 4:

1. Dynamics of information flows, its indicators.
2. Quantitative assessment of non-uniformity of information flows.

3. Accounting and control of information flows.
4. SEO (search engine optimization), SMO (social media optimization) and SMM (social media marketing) - social networks.
5. Methods and principles of optimization. SEO search engine optimization. White optimization. Gray optimization. Black optimization.
6. Forecasting and rationalization of information flows.
7. Instrumental and mathematical methods for estimating information flows. Information flows between socio-technical systems and the external environment.
8. Methods of managing information flows in socio-technical.

Content module 2.

Topic 5. Fundamentals of information and analytical activities in socio-technical systems

List of questions on topic 5:

1. Information and analytical work as an intellectual activity.
2. Methodological bases of information-analytical activity in the Internet and social networks.
3. Means and methods of analytical information processing.
4. Methods of identification of hidden information and hidden meanings in media texts.
5. Methods of information business analytics on the Internet.
6. Generalization, analysis and interpretation of fragments of information messages and media texts in information socio-technical systems.
7. Unauthorized information and analytical activities in socio-technical systems and ways to counter it.

Topic 6. User risks and security of information systems personnel at socio-technical attacks

List of questions on topic 5:

1. Socio-technical (socio-engineering) attacks.
2. Methods and examples of socio-engineering attack.
3. Models of socio-engineering attacks. Models of the complex "information system-staff". Information model of the user of the socio-technical system as an object of socio-engineering attack.
4. Methods for assessing the degree of protection of the complex "information system-personnel" from socio-engineering attacks.
5. Analysis and prediction of vulnerabilities of users and personnel of information systems during socio-engineering attacks.
6. Information security of the individual in information socio-technical systems.
7. External and internal threats to information systems.
8. Social security of information and communication technologies.

Topic 7. Information security in socio-technical systems

List of questions on topic 7:

1. Characteristics and classification of threats to information security in socio-technical systems.
2. Comprehensive protection of information in socio-technical systems.

TOPICS OF PRACTICAL WORK

Practical work 1. Research of general properties of socio-technical systems.

Practical work 2. Study of features of information logistics of socio-technical systems.

Practical work 3. Analysis of ways to ensure information security in socio-technical systems.

Practical work 4. Principles and methods of analysis of social networks.

Practical work 5. Search and information analytics on the Internet and social networks.

Practical work 6. Methods of analysis of the human factor in the management of socio-technical systems.

Practical work 7. System analysis of security risks of personnel and users of information socio-technical system.

Practical work 8. Methods of information-analytical activity in socio-technical systems.

3. Recommended literature

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5. Волобуев, С. В. Философия безопасности социотехнических систем: информационные аспекты / С. В. Волобуев. – М.: Вузовская книга, 2004. – 360 с.

6. Доровской В. А. Формализация деятельности человека в эргатических системах / ред. В. М. Михайленко. – Кривой Рог, 1998. – 263 с.

7. Котенко И. В., Саенко И. Б. Построение системы интеллектуальных сервисов для защиты информации в условиях кибернетического

противоборства / И. В. Котенко, И. Б. Саенко // Труды СПИИРАН. – 2012. – Вып. 22. – С. 84-100.

8. Котенко И. В. Применение технологии управления информацией и событиями безопасности для защиты информации в критически важных инфраструктурах / И. В. Котенко, И. Б. Саенко, О. В. Полубелова, А. А. Чечулин // Труды СПИ-ИРАН. – 2012. – Вып. 20. – С. 27-56.

9. Котенко И. В., Шоров А. В. Имитационное моделирование механизмов защиты компьютерных сетей от инфраструктурных атак на основе подхода «нервная система сети» / И. В. Котенко, А. В. Шоров // Труды СПИИРАН. – 2012.– Вып. 22. – С. 45–70.

10. Олескин А. В. Сетевые структуры в биосистемах / А. В. Олескин // Журнал общей биологии. – 2013. – том 74, № 2. – С. 112–138.

11. Тулупьев А. Л. Социально-психологические факторы, влияющие на степень уязвимости пользователей автоматизированных информационных систем с точки зрения социоинженерных атак / А. Л. Тулупьев, А. А. Азаров, Т. В. Тулупьева, А. Е. Пащенко, М. В. Степашкин // Труды СПИИРАН. – 2010. – Вып. 1 (12). – С. 200-214.

12. Dodds P. Generalized Model of Social and Biological Contagion / P. Dodds, D.A. Watts //Journal of Theoretical Biology. – 2005. – № 232. –P. 587-604.

13. Evendar, E. A Note on Maximizing the Spread of Influence in Social Networks / E. Evendar, A.Shapira // Internet and Network Economics. 2007. P. 281-286.

4. Form of final control of learning success

Semester (academic) control provides for the examination, during which the student is given a final grade for the discipline, which is ranked as the average of the results of the final module control and the result of rescheduling the grade for the discipline.

5. Means of diagnostics of success of training

Oral and written questioning, testing, current and module control work, defense of laboratory work, assessment of attendance and activity at lectures, practical and seminar classes, evaluation of independent work.