UNIVERSITY OF MISKOLC

FACULTY OF MECHANICAL ENGINEERING AND INFORMATICS

DANGEROUS GOODS LOGISTICS SPECIALIST

POSTGRADUATE SPECIALIZATION PROGRAMME

CURRICULUM

SUBJECT ANNOTATIONS

LECTURERS

Miskolc
2025

Curriculum and Subject Annotations

The duration of the programme is two semesters. The education is conducted through a correspondence system, with a total of 220 teaching hours.

Subjects	Contact hours and credits per semester		Assessment		
	I	II	E	T	S
	L+P/Cr	L+P/Cr			
BASIC SUBJECTS (12 credits)					
Fundamentals of Dangerous Goods	16+0/4			X	
Legal and Regulatory Framework for the Handling of Dangerous Goods	12+4/4		X		
Foundations of Dangerous Goods Logistics	12+4/4		X		
SPECIALISED SUBJECTS (28 credits)					
Handling of Dangerous Goods in Logistics	12+4/4			X	
Design of Dangerous Goods Logistics Processes	12+4/4			X	
Optimisation of Dangerous Goods Logistics Processes		12+4/4	X		
Simulation Analysis of Dangerous Goods Logistics Processes		12+4/4		X	
Tracking of Dangerous Goods	12+4/4			X	
Logistics of Special Dangerous Materials		8+8/4		X	
Logistics of Hazardous Waste		12+4/4		X	
ADDITIONAL SPECIALISED KNOWLEDGE (10 credits)					
Intelligent Solutions in Dangerous Goods Logistics	12+0/3			X	
Risk Management	8+4/3			X	
Data Security and Protection		12+4/4		X	
Thesis (10 credits)		0+20/10			X
Total	**96+24/30**	**56+44/30**			
Total	**152+68/60**				

L – lecture P – practical session Cr – credit E – exam T – term mark S – signature

Final exam subjects:

- Fundamentals of Dangerous Goods
  - Fundamentals of Dangerous Goods
  - Legal and Regulatory Framework for the Handling of Dangerous Goods
  - Handling of Dangerous Goods in Logistics
  - Logistics of Special Dangerous Materials
  - Logistics of Hazardous Waste
- Improving the Efficiency of Dangerous Goods Logistics Processes
  - Optimisation of Dangerous Goods Logistics Processes
  - Simulation Analysis of Dangerous Goods Logistics Processes
  - Intelligent Solutions in Dangerous Goods Logistics
  - Data Security and Protection

System of assessment and verification:

The system of assessment and verification consists of obtaining the term marks prescribed in the model curriculum, passing the required examinations, and successfully completing the final examination. Each subject has its own specific requirements for admission to the examination, such as the completion of individual assignments, submission of mid-term written reports, or preparation of a thesis.

Criteria for passing the final exam: completion of all study and examination requirements specified in the curriculum and a thesis reviewed and accepted by the examiner.

The thesis is an independent piece of work that deals with a theoretical or general topic related to the subjects of the specialist postgraduate training programme, or analyses a practical issue connected to professional practice. In addition to demonstrating familiarity with both domestic and international literature, it also proves that the student is capable of independently applying their knowledge through the analysis and synthesis of the relevant literature.

The final examination consists of two parts: the defence of the thesis and a comprehensive examination covering the knowledge acquired in the subjects of the training programme.

Recognition of prior learning and experience:

The recognition and transfer of previously acquired knowledge and practical experience are carried out in accordance with the provisions set out in the Study and Examination Regulations of the Student Requirements System, Volume III of the Organisational and Operational Rules of the University of Miskolc.

Subject Datasheets

Subject name: **Fundamentals of Dangerous Goods**	Credit: **4**
Subject category: **compulsory**	
Theoretical or practical nature of the subject, "training character": 80/20% (credit%)	
Type of class: **lecture + practical session** and number of hours: **16+0** in the given semester, Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -	
Method of assessment (exam / term mark / other): **term mark** Additional (*specific*) methods used in knowledge assessment *(if any)*: -	
Place of the subject in the curriculum (semester): **1st semester**	
Prerequisites *(if any)*: -	
Course description: concise and informative description of the knowledge to be acquired	
Aim of the subject: Students will become familiar with the classification system for dangerous goods, the properties of dangerous goods, the identification of dangerous substances and objects, and the methods for classifying hazardous waste as dangerous goods. **Subject topics:** 1) Basic principles of dangerous goods classification. 2) Classification of solutions and mixtures (preparations and wastes) as dangerous goods. 3) Classification of dangerous objects, equipment, devices and samples. 4) Classification of empty packaging. 5) Special features of each transport class. 6) Classification parameters. 7) Tests required for classification.	
List of the 2-5 most important *required* and *recommended* literature (notes, textbooks) with bibliographic data (author, title, publication data, (possibly pages), ISBN)	
Required literature: 1. Globally Harmonised System of Classification and Labelling of Chemicals (GHS) 2. The Manual of Tests and Criteria contains criteria, test methods and procedures to be used for classification of dangerous goods according to the provisions of the "United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations". 3. Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) *Recommended literature:* -	
List of the required professional competences and competence elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way	
a) Knowledge – Knows the storage and transport requirements for dangerous goods, as well as the relevant domestic and international regulations. – Knows the basic principles of logistics system design and operation. – Knows the relevant risk analysis and risk management methods related to dangerous goods. – Knows the tools and procedures for ensuring legal compliance in logistics systems.	

b) Skills

- Is able to recognise, systematically evaluate and manage the interrelationships and mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Is able to plan, operate and optimise logistics processes related to dangerous goods based on a systematic approach, taking into account safety and legal requirements.
- Able to control and develop storage and transport processes related to dangerous goods, including the application of risk analysis and risk management procedures.
- Able to apply integrated knowledge in the areas of logistics processes for dangerous goods, the machinery and equipment used to implement them, process theory, industrial production processes and related digital technologies.

c) Attitude

- Open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.

d) Autonomy and responsibility

- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Dr. György Sárosi, Managing Director, Hungária Veszélyesáru Mérnöki Iroda**

Lecturers involved in teaching the subject, if any (*name, position, academic degree*): **Éva Sárosi, Zoltán Bencsik, György Kucsera**

Subject name: **Legal and Regulatory Framework for the Handling of Dangerous Goods**	Credit: **4**

Subject category: **compulsory**

Theoretical or practical nature of the subject, "training character": 75/25% (credit%)

Type of class: **lecture + practical session**. and number of hours: **12+4** in the given semester,
Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -

Method of assessment (exam / term mark / other): **exam**
Additional (*specific*) methods used in knowledge assessment *(if any)*: -

Place of the subject in the curriculum (semester): **1st semester**

Prerequisites *(if any)*: -

Course description: a concise yet informative description of the knowledge to be acquired

Aim of the subject:
During the courses, students will learn about the international legal framework of dangerous goods logistics and supply chain logistics, including international conventions on the transport of dangerous goods, the specifics of the regulatory framework, as well as liability issues related to dangerous goods and the identification of responsible persons, and the obligations of supply chain participants.

Subject topics:

1) Legal and regulatory framework for dangerous goods
2) International and domestic dangerous goods regulations and conventions (ADR, RID, ADN, IMDG, IATA DGR)
3) Classification, identification and labelling requirements for dangerous goods
4) Rules and concessions for the packaging and transport of dangerous goods
5) Handling of dangerous goods in the logistics chain: storage, loading, transhipment and tracking
6) Risks and liability issues related to the transport of dangerous goods
7) Official inspections, legal consequences and liability in the event of non-compliance
8) Innovations and the use of digital technologies in the logistics of dangerous goods

List of 2-5 most important *required* and *recommended* literature (notes, textbooks) with bibliographic data (author, title, publication details, (possibly pages), ISBN)

Required literature:

1. European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN)
2. Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)
3. The Regulation concerning the International Carriage of Dangerous Goods by Rail (RID)

Recommended literature:

1. The International Maritime Dangerous Goods (IMDG) Code
2. IATA Dangerous Goods Regulations (IATA DGR) manual

List of the required professional competences and competence elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way

a) Knowledge

- Knows the storage and transport requirements for dangerous goods, as well as the relevant domestic and international regulations.
- Knows the basic principles of logistics system design and operation.
- Knows the relevant risk analysis and risk management methods related to dangerous goods.

- Knows the digital tracking and management systems of logistics processes, including automated solutions.
- Knows the design and development options for sustainable and safe logistics solutions.
- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills
- Able to recognise, systematically evaluate and manage the interrelationships and impact mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Is able to plan, operate and optimise logistics processes related to dangerous goods based on a systematic approach, taking into account safety and legal requirements.
- Able to control and develop storage and transport processes related to dangerous goods, including the application of risk analysis and risk management procedures.
- Able to apply integrated knowledge in the areas of logistics processes for dangerous goods, the machinery and equipment used to implement them, process theory, industrial production processes and related digital technologies.
- Able to define logistics systems, warehouses and transport infrastructures for dangerous goods, as well as to manage and operate them efficiently.

c) Attitude
- Strives to enforce sustainability, environmental awareness, safety, health protection and energy efficiency requirements in the operation and development of logistics systems.
- Strives to perform their work using a systematic and process-oriented mindset and a complex approach, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility
- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Dr. György Sárosi, Managing Director, Hungária Veszélyesáru Mérnöki Iroda**

Lecturers involved in teaching the subject, if any (*name, position, academic degree*): **Dr. Ádám Tálosi, Zoltán Bencsik**

Subject name: **Foundations of Dangerous Goods Logistics**	Credit: **4**
Subject category: **compulsory**	
Theoretical or practical nature of the subject, "training character": 75/25% (credit%)	
Type of class: **lecture + practical session** and number of hours: **12+4** in the given semester, Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -	
Method of assessment (exam / term mark / other): **exam** Additional (*specific*) methods used in knowledge assessment *(if any)*: -	
Place of the subject in the curriculum (semester): **1st semester**	
Prerequisites *(if any)*: -	
Course description: a concise yet informative description of the knowledge to be acquired	
Aim of the subject: During the course, students will learn about the basics of logistics and the most important types of tools used in logistics processes and how they work. The most important types of logistics systems will be presented, as well as the goods handling tasks involved in their operation, with particular emphasis on the movement of dangerous goods. **Subject topics:** 1. Basic knowledge of logistics. 2. Logistics systems. 3. Basics of material handling. 4. Equipment for material handling in factories. 5. Means of transport outside the plant. 6. Goods, units, unit loads in logistics. 7. Logistical aspects of hazardous materials. 8. Handling dangerous goods in logistics systems.	
List of the 2-5 most important *required* and *recommended* readings (notes, textbooks) with bibliographic data (author, title, publication data, (possibly pages), ISBN)	
Required literature: 1. J. M. Apple: Material handling system design, J. Wiley and Sons, 1977. 2. Michael G. Kay: Material Handling Equipment, North Carolina State University, 2012. *Recommended literature:* 1. Ten Hompel, M., Schmidt, T. & Nagel, L. (Eds.). (2007). Material Flow Systems. Conveyor and Storage Technology. Berlin: Springer 2. Kulwiec, R. A. (ed.) (1985). Materials handling handbook. John Wiley & Sons. New York	
List of the required professional competencies and competency elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way	
a) Knowledge – Knows the storage and transport requirements for dangerous goods and the relevant national and international regulations. – Knows the basic principles of logistics system design and operation. – Knows the digital tracking and management systems of logistics processes, including automated solutions. – Knows the design and development options for sustainable and safe logistics solutions. – Knows modern technologies and tools for warehousing, transport and supply chain management.	

- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills
- Able to recognise, systematically evaluate and manage the interrelationships and mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Is able to plan, operate and optimise logistics processes related to dangerous goods based on a systematic approach, taking into account safety and legal requirements.
- Able to control and develop storage and transport processes related to dangerous goods, including the application of risk analysis and risk management procedures.
- Able to apply integrated knowledge in the areas of logistics processes for dangerous goods, the machinery and equipment used to implement them, process theory, industrial production processes and related digital technologies.

c) Attitude
- Open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility
- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Dr. Péter Telek, associate professor, PhD**
Lecturer(s) involved in teaching the subject, if any (*name, position, academic degree*): **-**

Subject name: **Handling of Dangerous Goods in Logistics**	Credit: **4**

Subject category: **compulsory**

Theoretical or practical nature of the subject, "training character": 75/25% (credit%)

Type of class: **lecture + practical session**. and number of hours: **12+4** in the given semester,
Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -

Method of assessment (exam / term mark / other): **term mark**
Additional (*specific*) methods used in assessment *(if any)*: -

Place of the subject in the curriculum (semester): **1st semester**

Prerequisites *(if any)*: -

Course description: concise yet informative description of the knowledge to be acquired

Aim of the subject:
Students will become familiar with the conditions for the temporary and interim storage of dangerous goods, the industrial safety licensing procedures for warehousing, and the special conditions for port and terminal handling.

Subject topics:
1) The role of standardisation in the storage of dangerous goods.
2) Transitional, temporary and passive storage in the logistics process.
3) Industrial safety (Seveso) licensing.
4) Handling of dangerous goods in the supply chain.
5) Port and terminal handling, transhipment.

List of 2-5 most important *required* and *recommended* literature (notes, textbooks) with bibliographic data (author, title, publication details, (possibly pages), ISBN)

Required literature:
1. Risk Assessment for Industrial Accident Prevention UNECE 2023

Recommended literature:
1. International Safety Guide for Inland Navigation Tank-barges and Terminals (ISGINTT)
2. Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas
3. Ministry for Housing, Spatial Planning and the Environment (VROM). Risk analysis methodology for Cpr-15 establishments. The Hague, October 1997.
4. The Crash Detectives: Investigating the World's Most Mysterious Air Disasters Christine Negroni, 2016. ISBN: 0143127322

List of the required professional competences and competence elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way

a) Knowledge
- Knows the storage and transport requirements for dangerous goods, as well as the relevant domestic and international regulations.
- Knows the basic principles of logistics system design and operation.
- Knows the relevant risk analysis and risk management methods related to dangerous goods.
- Knows the digital tracking and management systems of logistics processes, including automated solutions.
- Knows the design and development possibilities of sustainable and safe logistics solutions.
- Knows modern technologies and tools for warehousing, transport and supply chain management.

- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills
- Able to recognise, systematically evaluate and manage the interrelationships and mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Is able to plan, operate and optimise logistics processes related to dangerous goods based on a systematic approach, taking into account safety and legal requirements.
- Able to apply integrated knowledge in the areas of logistics processes for dangerous goods, the machinery and equipment used to implement them, process theory, industrial production processes and related digital technologies.
- Able to define logistics systems, warehouses and transport infrastructures for dangerous goods, as well as to manage and operate them efficiently.

c) Attitude
- Open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility
- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **János Tálosi, CEO, Trusty Business Management Ltd.**
Lecturer(s) involved in teaching the subject, if any (*name, position, academic degree*): **-**

Subject name: **Design of Dangerous Goods Logistics Processes**	Credit: **4**

Subject category: **compulsory**

Theoretical or practical nature of the course, "training character": 75/25% (credit%)

Type of class: **lecture + practical session** and number of hours: **12+4** in the given semester,
Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -

Method of assessment (exam / term mark / other): **term mark**
Additional (*specific*) methods used in knowledge assessment *(if any)*: -

Place of the subject in the curriculum (semester): **1st semester**

Prerequisites *(if any)*: -

Course description: concise yet informative description of the knowledge to be acquired

Aim of the subject:
Students will learn about the bulk, parcel and tank transport of dangerous goods, the selection of optimal transport packaging and transport modes, multimodality and the planning of dangerous goods logistics processes, the identification of transport risks and the establishment of conditions for the safe transport of dangerous goods.

Subject topics:

1) Conditions for the safe transport of dangerous goods.
2) Methods of transporting dangerous goods and their application according to transport modes.
3) Multimodal transport.
4) Handling of dangerous goods in the transport chain, transhipment.
5) Transport of dangerous goods in limited quantities.
6) Transport of dangerous goods in limited quantities.
7) Criteria for planning the logistics process for dangerous goods.

List of the 2-5 most important *required* and *recommended* references (notes, textbooks) with bibliographic data (author, title, publication details, (pages if applicable), ISBN)

Required literature:

1. European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN)
2. Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)
3. The Regulation concerning the International Carriage of Dangerous Goods by Rail (RID)

Recommended literature:

1. The International Maritime Dangerous Goods (IMDG) Code
2. IATA Dangerous Goods Regulations (IATA DGR) manual

List of the required professional competences and competence elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way

a) Knowledge

- Knows the storage and transport requirements for dangerous goods, as well as the relevant domestic and international regulations.
- Knows the basic principles of logistics system design and operation.
- Knows the digital tracking and management systems of logistics processes, including automated solutions.
- Knows the design and development options for sustainable and safe logistics solutions.

- Knows modern technologies and tools for warehousing, transport and supply chain management.
- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills
- Able to recognise, systematically evaluate and manage the interrelationships and mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Is able to plan, operate and optimise logistics processes related to dangerous goods based on a systematic approach, taking into account safety and legal requirements.
- Able to apply integrated knowledge in the areas of logistics processes for dangerous goods, the machinery and equipment used to implement them, process theory, industrial production processes and related digital technologies.
- Able to define logistics systems, warehouses and transport infrastructures for dangerous goods, as well as to manage and operate them efficiently.

c) Attitude
- Open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility
- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In its decisions, it takes into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the fundamental requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Dr. György Sárosi, Managing Director, Hungária Veszélyesáru Mérnöki Iroda**

Lecturers involved in teaching the subject, if any (*name, position, academic degree*): **Zoltán Bencsik, Éva Sárosi**

Subject name: **Optimisation of Dangerous Goods Logistics Processes**	Credit: **4**

Subject category: **compulsory**

Theoretical or practical nature of the subject, "training character": 75/25% (credit%)

Type of class: **lecture + practical session** and number of hours: **12+4** in the given semester,
Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -

Method of assessment (exam / term mark / other): **exam**
Additional (*specific*) methods used in knowledge assessment *(if any)*: -

Place of the subject in the curriculum (semester): **2nd semester**

Prerequisites *(if any)*: -

Course description: a concise yet informative description of the knowledge to be acquired

Aim of the subject:
The optimal design of logistics systems for handling hazardous materials, both within and outside the plant, is an essential prerequisite for efficient operation. The optimal design of logistics systems for handling hazardous materials requires the solution of a number of design tasks, such as installation, layout planning, route planning, scheduling, reliability planning and stocking. In this course, students will learn the basic methods of logistics system design. In addition to theoretical knowledge, we will also discuss practical applications in the form of case studies.

Subject topics:
1) Fundamentals of logistics system design and optimisation, typical logistics systems.
2) Installation, layout planning.
3) Route optimisation.
4) Scheduling.
5) Reliability.
6) Network planning.
7) Stocking.

List of 2-5 most important *required* and *recommended* literature (notes, textbooks) with bibliographic data (author, title, publication details, (possibly pages), ISBN)

Required literature:
1. Wayne L. Winston: Operations Research – Applications and Algorithms, Duxbury press, Boston, 1997. ISBN 9780534520205
2. A. Ravindran, K. M. Ragsdell, G. V. Reklaitis: Engineering Optimization: Methods and Applications, 2006. ISBN 9780471558149

Recommended literature:
1. James M. Apple: Plant layout and material handling, John Wiley & Sons, ISBN 0471-07171-4
2. David Simci-Levi, Xin Chen, Julien Bramel: The Logic of Logistics, Springer, ISBN 0-387-22199-9

List of the required professional competences and competence elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way

a) Knowledge
- Knows the storage and transport requirements for dangerous goods, as well as the relevant domestic and international regulations.
- Knows the basic principles of logistics system design and operation.
- Knows the digital tracking and management systems of logistics processes, including automated solutions.

- Knows the design and development options for sustainable and safe logistics solutions.
- Knows modern technologies and tools for warehousing, transport and supply chain management.
- Knows supply chain process planning and optimisation methods and their practical application.

b) Skills
- Is able to recognise, systematically evaluate and manage the interrelationships and mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Able to plan, operate and optimise logistics processes related to dangerous goods based on a systems approach, taking into account safety and legal requirements.
- Able to apply integrated knowledge in the areas of logistics processes for dangerous goods, the machines and equipment used to implement them, process theory, industrial production processes and related digital technologies.
- Able to identify logistics systems, warehouses and transport infrastructures dealing with dangerous goods, as well as to manage and operate them efficiently.

c) Attitude
- Is open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility
- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.

Subject coordinator (*name, position, academic degree*): **Dr. Tamás Bányai, full professor, PhD, dr. habil**

Lecturer involved in teaching the course, if any (*name, position, academic degree*): **Dr. Péter Veres, associate professor, PhD**

Subject name: **Simulation Analysis of Dangerous Goods Logistics Processes**	Credit: **4**

Subject category: **compulsory**

Theoretical or practical nature of the subject, "training character": 75/25% (credit%)

Type of class: **lecture + practical session** and number of hours: **12+4** in the given semester,

Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -

Method of assessment (exam / term mark / other): **term mark**

Additional (*specific*) methods used in knowledge assessment *(if any)*: -

Place of the subject in the curriculum (semester): **2nd semester**

Prerequisites *(if any)*: -

Course description: concise yet informative description of the knowledge to be acquired

Aim of the subject:
The aim of the course is to teach students simulation testing solutions for logistics systems handling hazardous materials, which serve to minimise risks and losses. During the course, students will learn the basic methods of simulation testing of logistics systems and deepen their knowledge through real-life industrial case studies and practical problem solving.

Subject topics:

1) The concept, objectives and areas of application of logistics simulation
2) Simulation testing methods in dangerous goods logistics.
3) Description of the operation of simulation frameworks
4) Basic modelling knowledge
5) Industrial case studies
6) Simulation modelling and testing

List of 2-5 most important *required* and *recommended* literature (notes, textbooks) with bibliographic data (author, title, publication details, (pages if applicable), ISBN)

Required literature:

1. Tamás, P. Innovative Simulation Testing Methods in Logistics. Miskolc-Egyetemváros, Magyarország: Miskolci Egyetem, Logisztikai Intézet, 2021, 110 p. ISBN 978-963-358-239-8.

Recommended literature:

1. Kovács, Gy., Tamás, P. Simulation Methods in Logistics. Miskolc-Egyetemváros, Magyarország: Miskolci Egyetem, 2016, 195 p. ISBN 978-963-358-120-9.
2. Womack, J. P., Jones, D. T. Lean Thinking. New York, USA: Simon & Schuster Inc., 2008.

List of the required professional competences and competence elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way

a) Knowledge

- Knows the storage and transport requirements for dangerous goods, as well as the relevant domestic and international regulations.
- Knows the basic principles of logistics system design and operation.
- Knows the digital tracking and management systems of logistics processes, including automated solutions.
- Knows the possibilities for planning and developing sustainable and safe logistics solutions.
- Knows modern technologies and tools for warehousing, transport and supply chain management.

- Knows supply chain process planning and optimisation methods and their practical application.
- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills
- Able to recognise, systematically evaluate and manage the interrelationships and mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Is able to plan, operate and optimise logistics processes related to dangerous goods based on a systematic approach, taking into account safety and legal requirements.
- Able to control and develop storage and transport processes related to dangerous goods, including the application of risk analysis and risk management procedures.
- Able to apply integrated knowledge in the areas of logistics processes for dangerous goods, the machinery and equipment used to implement them, process theory, industrial production processes and related digital technologies.
- Able to define logistics systems, warehouses and transport infrastructures for dangerous goods, as well as to manage and operate them efficiently.

c) Attitude
- Open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility
- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Prof. Dr. Péter Tamás, head of institute, full professor, PhD, dr. habil**

Lecturer involved in teaching the subject, if any (*name, position, academic degree*): **Péter Kováts, technical assistant**

Subject name: **Tracking of Dangerous Goods**	Credit: **4**

Subject category: **compulsory**

Theoretical or practical nature of the subject, "training character": 75/25% (credit%)

Type of class: **lecture + practical session** and number of hours: **12+4** in the given semester,
Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -

Method of assessment (exam / term mark / other): **term mark**
Additional (*specific*) methods used in knowledge assessment *(if any)*: -

Place of the subject in the curriculum (semester): **1st semester**

Prerequisites *(if any)*: -

Course description: concise yet informative description of the knowledge to be acquired

Aim of the subject:
During the course, students will learn about standard identification, data collection and data sharing processes in the supply chain, particularly in relation to the tracking of dangerous goods. Another objective is for students to learn about the practical applications of the regulations and standardisation solutions relevant to the sector. This will enable the development of the supply chain, with the development tools of tracking systems, the possibilities offered by the tools, and directions for development.

Subject topics:

1) The role of standardisation in the logistics management of dangerous goods
2) Technological standards and innovation,
3) ADR challenges for dangerous goods,
4) Industrial standards related to dangerous goods, standardisation procedures and methods,
5) The role and relationship of the ISO standard system
6) The role and relationship of the GS1 standard system
7) The role of tracking in the development of supply processes,
8) Development of a tracking system for dangerous goods,
9) Review and development opportunities for the tracking of dangerous goods.

List of the 2-5 most important *required* and *recommended* references (notes, textbooks) with bibliographic data (author, title, publication details, (possibly pages), ISBN)

Required literature:

1. Juhász, J. (2025) Impacts of logistics processes in standardization and traceability systems, Advanced Logistic Systems - Theory and Practice, 19(3), pp. 38–43. DOI: https://doi.org/10.32971/als.2025.014
2. European Commission. (2013). Smart Logistics Standardisation Needs and Roadmap (D3.004). CORDIS Project 285326. https://cordis.europa.eu/docs/projects/cnect/6/285326/080/deliverables/001-D3004SmartLogisticsStandardisationV10Final.pdf
3. Sun, Y., Chen, Q., Guo, J. et al. A risk-based review of dangerous goods storage and handling at a manufacturing facility. The International Journal of Advanced Manufacturing Technology 138, 4313–4336 (2025). DOI: https://doi.org/10.1007/s00170-025-15778-3
4. GS1 case studies. https://www.gs1.org/insights-events/case-studies

Recommended literature:

5. Karolina Kolinska Et Al (2022). Supply Chain Digitization Using GS1 Standards – Research Results, European Research Studies Journal, Volume XXV Special Issue A, 326-335. DOI: https://doi.org/10.35808/ersj/2965

List of the required professional competences and competence elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way

a) Knowledge

- Knows the storage and transport requirements for dangerous goods, as well as the relevant domestic and international regulations.
- Knows the basic principles of logistics system design and operation.
- Knows the digital tracking and management systems of logistics processes, including automated solutions.
- Knows the design and development options for sustainable and safe logistics solutions.
- Knows modern technologies and tools for warehousing, transport and supply chain management.
- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills

- Able to recognise, systematically evaluate and manage the interrelationships and mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Is able to plan, operate and optimise logistics processes related to dangerous goods based on a systematic approach, taking into account safety and legal requirements.
- Able to apply integrated knowledge in the areas of logistics processes for dangerous goods, the machines and equipment used to implement them, process theory, industrial production processes and related digital technologies.
- Able to define logistics systems, warehouses and transport infrastructures for dangerous goods, as well as to manage and operate them efficiently.

c) Attitude

- Open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility

- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Dr János Juhász, senior lecturer, PhD**

Lecturer(s) involved in teaching the subject, if any (*name, position, academic degree*): **-**

Subject name: **Logistics of Special Dangerous Materials**	Credit: **4**
Subject category: **compulsory**	
Theoretical or practical nature of the subject, "training character": 50/50% (credit%)	
Type of class: **lecture + practical session**. and number of hours: **8+8** in the given semester, Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -	
Method of assessment (exam / term mark / other): **term mark** Additional (*specific*) methods used in knowledge assessment *(if any)*: -	
Place of the subject in the curriculum (semester): **2nd semester**	
Prerequisites *(if any)*: -	
Course description: concise yet informative description of the knowledge to be acquired	
Aim of the subject: In this course, we examine the logistical characteristics of various hazardous materials, including specific issues related to the transport, storage and handling of batteries, explosives and radioactive materials. **Subject topics:** 1) The dangers of batteries in the transport chain. 2) Risk assessment and management in battery logistics. 3) Special conditions for the transport and storage of batteries. 4) Authorisation procedures for explosives. 5) Handling of pyrotechnic materials. 6) Military shipments. 7) Handling and storage of explosives and pyrotechnic products. 8) Licensing procedures for radioactive materials. 9) Handling of radioactive medicines and other radioactive materials.	
List of the 2-5 most important *required* and *recommended* literature (notes, textbooks) with bibliographic data (author, title, publication details, (possibly pages), ISBN)	
Required literature: 1. IATA Guidance Document for Lithium Batteries and Sodium ion Batteries – 2025. 2. IAEA Safety Standards Series No. SSR-6 (Rev.1) 2018 IAEA 3. IATG INTERNATIONAL AMMUNITION TECHNICAL GUIDELINES 2021. *Recommended literature:* 1. The Manual of Tests and Criteria contains criteria, test methods and procedures to be used for classification of dangerous goods according to the provisions of the "United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations	
List of the required professional competences and competence elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way	
a) Knowledge – Knows the storage and transport requirements for dangerous goods and the relevant national and international regulations. – Knows the basic principles of logistics system design and operation. – Knows the digital tracking and management systems of logistics processes, including automated solutions. – Knows the design and development options for sustainable and safe logistics solutions.	

- Knows modern technologies and tools for warehousing, transport and supply chain management.
- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills
- Able to recognise, systematically evaluate and manage the interrelationships and mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Able to control and develop storage and transport processes related to dangerous goods, including the application of risk analysis and risk management procedures.
- Able to apply integrated knowledge in the areas of dangerous goods logistics processes, the machinery and equipment used to implement them, process theory, industrial production processes and related digital technologies.
- Able to define logistics systems, warehouses and transport infrastructures for dangerous goods, as well as to manage and operate them efficiently.

c) Attitude
- Open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility
- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Dr György Sárosi, Managing Director, Hungária Veszélyesáru Mérnöki Iroda**

Lecturers involved in teaching the subject, if any (*name, position, academic degree*): **Zoltán Bencsik, Dr. Gábor Lengyel, Szabolcs Tóth**

Subject name: **Logistics of Hazardous Waste**	Credit: **4**

Subject category: **compulsory**

Theoretical or practical nature of the subject, "training character": 75/25% (credit%)

Type of class: **lecture + practical session** and number of hours: **12+4** in the given semester,
Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -

Method of assessment (exam / term mark / other): **term mark**
Additional (*specific*) methods used in knowledge assessment *(if any)*: -

Place of the subject in the curriculum (semester): **2nd semester**

Prerequisites *(if any)*: -

Course description: concise yet informative description of the knowledge to be acquired

Aim of the subject:
During the course, students will learn about the circular economy model and the EU and domestic legal framework that shapes its development. The course presents typical solutions for logistics systems related to the processing and recycling of hazardous materials, municipal waste and used durable consumer products, as well as the legal and economic methods that operate the system beyond technical solutions.

Subject topics:
The concept of reverse logistics, its application in internal company processes and external logistics systems. The "circular economy" model, the characteristics of logistics sub-processes, technical solutions, and the specifics of handling different types of waste. Classification of hazardous waste. Collection, transport and storage of hazardous waste, and the equipment used for these purposes. Material and information flow processes for hazardous waste.

List of 2-5 most important *required* and *recommended* literature (notes, textbooks) with bibliographic data (author, title, publication data, (possibly pages), ISBN)

Required literature:

1. Kumar, A., Thakur, A. K., Gaurav, G. K., Klemeš, J. J., Sandhwar, V. K., Pant, K. K., & Kumar, R. (2023). A critical review on sustainable hazardous waste management strategies: A step towards a circular economy. Environmental Science and Pollution Research, 30, 105030–105055. https://doi.org/10.1007/s11356-023-29511-8
2. Pereira, C., Ramos, M., & Martinho, G. (2025). Key factors to improve the management of household hazardous waste. Journal of Environmental Management, 393, 126940. https://doi.org/10.1016/j.jenvman.2025.126940
3. European Union. (2023). EU actions to address the increasing amount of hazardous waste (Review 02/2023) https://www.eca.europa.eu/lists/ecadocuments/rw23_02/rw_hazardous_waste_en.pdf

Recommended literature:

1. Li, H., Yang, J., & Zhang, W. (2025). Optimization of Reverse Logistics Networks for Hazardous Waste Incorporating Health, Safety, and Environmental Management: Insights from Large Cruise Ship Construction. Applied Sciences, 15(11), 6056. https://doi.org/10.3390/app15116056
2. Namen, A. A., da Costa Brasil, F., Abrunhosa, J. J. G., Abrunhosa, G. G. S., Tarré, R. M., & Marques, F. J. G. (2014). RFID technology for hazardous waste management and tracking. Waste Management & Research: The Journal for a Sustainable Circular Economy, 32(9_suppl), 59–66. https://doi.org/10.1177/0734242X14536463

List of the required professional competences and competence elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way

a) Knowledge

- Knows the storage and transport requirements for dangerous goods, as well as the relevant domestic and international regulations.
- Knows the basic principles of logistics system design and operation.
- Knows the digital tracking and management systems of logistics processes, including automated solutions.
- Knows the design and development options for sustainable and safe logistics solutions.
- Knows modern technologies and tools for warehousing, transport and supply chain management.
- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills

- Able to recognise, systematically evaluate and manage the interrelationships and mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Is able to plan, operate and optimise logistics processes related to dangerous goods based on a systematic approach, taking into account safety and legal requirements.
- Able to control and develop storage and transport processes related to dangerous goods, including the application of risk analysis and risk management procedures.
- Able to define logistics systems, warehouses and transport infrastructures for dangerous goods, as well as to manage and operate them efficiently.

c) Attitude

- Is open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility

- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Dr. Ágota Bányainé Tóth, full professor, PhD, dr. habil**

Lecturer involved in teaching the subject, if any (*name, position, academic degree*): **Dr. Péter Veres, associate professor, PhD**

Subject name: **Intelligent Solutions in Dangerous Goods Logistics**	Credit: **3**
Subject category: **compulsory**	
Theoretical or practical nature of the subject, "training character": 80/20% (credit%)	
Type of class: **lecture + practical session** and number of hours: **12+0** in the given semester, Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -	
Method of assessment (exam / term mark / other): **term mark** Additional (*specific*) methods used in knowledge assessment *(if any)*: -	
Place of the subject in the curriculum (semester): **1st semester**	
Prerequisites *(if any)*: -	
Course description: a concise yet informative description of the knowledge to be acquired	

Aim of the subject:
During the course, students will learn about intelligent and automated solutions for handling dangerous goods. The nature of the solutions depends on the type of dangerous goods (goods to be used or already waste) and their physical state (solid, liquid or gas). The course presents the individual systems and their components based on this line of thought.

Subject topics:

1. General overview of intelligent solutions
2. General intelligent logistics machines
3. Intelligent handling of dangerous goods
4. Intelligent handling of hazardous waste
5. Introduction to Logistics 4.0 Laboratory as an example of intelligent logistics and intelligent waste collection solutions

List of 2-5 most important *required* and *recommended* readings (notes, textbooks) with bibliographic data (author, title, publication details, (pages if applicable), ISBN)

Required literature:

1. Ten Hompel, Michael; Roidl, Moritz. (2022). 3.1 Keynote on Industry 4.0. https://www.degruyterbrill.com/document/doi/10.1515/9783110785982-003/
2. Varde, Aparna. (2025). Robots, Drones, and Automated Vehicles. In book: Artificial Intelligence in Smart Cities: Foundations and Applications, Chapter: 2, Publisher: Springer Publishers, https://www.researchgate.net/publication/387062703_Robots_Drones_and_Automated_Vehicles
3. Cservenák, Ákos; Bányai, Tamás. (2020). Smartbin development for cyber-physical waste collection, In: Michael, Schenk; Elke, Glistau: 13th International Doctoral Students Workshop on Logistics, Magdeburg, Németország : Otto-von-Guericke-Universität Magdeburg, pp. 45-48., 4 p

Recommended literature:

1. M. Hassanalian, A. Abdelkefi. (2017). Classifications, applications, and design challenges of drones: A review, Progress in Aerospace Sciences, Volume 91, 2017, Pages 99-131, ISSN 0376-0421, DOI: 10.1016/j.paerosci.2017.04.003.
2. IATA, https://www.iata.org
3. Bento, Marco. (2022). Mobile Robotics. Publisher: Mesleki Girişimciler ve Toplum Gönüllüleri DerneğiI, SBN: 978-605-70651-1-7 https://www.researchgate.net/publication/367150783_Mobile_Robotics

List of the required professional competencies and competency elements *(knowledge, skills*, etc., *KKK 7*) to which the subject typically contributes in a meaningful way

a) Knowledge

- Knows the storage and transport requirements for dangerous goods and the relevant national and international regulations.
- Knows the basic principles of logistics system design and operation.
- Knows the digital tracking and management systems of logistics processes, including automated solutions.
- Knows the design and development options for sustainable and safe logistics solutions.
- Knows supply chain process planning and optimisation methods and their practical application.
- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills

- Able to recognise, systematically evaluate and manage the interrelationships and impact mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Is able to plan, operate and optimise logistics processes related to dangerous goods based on a systematic approach, taking into account safety and legal requirements.
- Able to apply integrated knowledge in the areas of logistics processes for dangerous goods, the machinery and equipment used to implement them, process theory, industrial production processes and related digital technologies.
- Able to define logistics systems, warehouses and transport infrastructures for dangerous goods, as well as to manage and operate them efficiently.

c) Attitude

- Open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility

- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Dr. Ákos Cservenák, senior lecturer, PhD**

Lecturer(s) involved in teaching the subject, if any (*name, position, academic degree*): **-**

Subject name: **Risk Management**	Credit: **3**
Subject category: **compulsory**	
Theoretical or practical nature of the subject, "training character": 70/30% (credit%)	
Type of class: **lecture + practical session** and number of hours: **8+4** in the given semester, Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -	
Method of assessment (exam / term mark / other): **term mark** Additional (*specific*) methods used in assessment *(if any)*: -	
Place of the subject in the curriculum (semester): **1st semester**	
Prerequisites *(if any)*: -	
Course description: concise yet informative description of the knowledge to be acquired	

Aim of the subject:
During the course, students will learn about the basics of risk management, including the concept of risk, its types, and the possibilities and tools for its analysis. Risk factors related to the supply chain will be presented. After discussing the issue of resilience, students will learn about the risks involved in the handling (storage, transport, use) of dangerous goods in the logistics systems of supply chain members dealing with dangerous goods, as well as possible analysis techniques.

Subject topics:

1. Basic knowledge of risk and risk management (concept, process, identification of risk sources).
2. Corporate risk management.
3. Risk analysis options (qualitative and quantitative risk analysis).
4. Supply chain management and supply chain risk management.
5. Classification of dangerous goods (identification of risk factors based on their nature).
6. Special rules for the storage of dangerous goods.
7. Special rules for the transport of dangerous goods.
8. Risk management of dangerous goods.

List of the 2-5 most important *required* and *recommended* references (notes, textbooks) with bibliographic data (author, title, publication details, (possibly pages), ISBN)

Required literature:

1. Christopher M. (2016): Logistics and Supply Chain Management, FT Publishing International
2. Manners-Bell J. (2023): Supply Chain Risk Management: How to Design and Manage Resilint Supply Chains, Kogan Page
3. Hopkin P. (2018): Fundalmentals of Risk Management: Understanding, Evaluating and Implementing Effective Risk Management, Kogan Page

Recommended literature:

1. Guo Y. & Liu F. & Song J-S. & Wang S. (2024): Supply chain resilience: A review from inventory management perspective, Fundamental Research, in press
2. Huang W. & Shuai B. & Zuo B. & Xu B. & Antwi E. (2019): A systematic railway dangerous goods transportation system risk analysis approach: The 24 model, Journal of Loss Prevention in the Process Industries 61, pp. 94-103.
3. Kanj H. & Kulaglic A. & Aly W. H. F. & Al-Tarawneh M. A. B. & Safi K. & Kanj S. & Flaus J-M. (2025): Agent-based risk analysis model for road transportation of dangerous goods, Results in Engineering 25, doi.org/103944

4. Timajchi A. & Al-e-Hashem S. M. J. M. & Rekik Y. (2019): Inventory routing problem for hazardous and deteriorating items in the presence of accident risk with transshipment option, International Journal of Production Economics 209, pp. 302-315.

List of the required professional competences and competence elements *(knowledge, skills*, etc., *KKK 7*) to which the course typically contributes in a meaningful way

a) Knowledge

- Knows the storage and transport requirements for dangerous goods and the relevant domestic and international regulations.
- Knows the basic principles of logistics system design and operation.
- Knows the relevant risk analysis and risk management methods related to dangerous goods.
- Knows the possibilities for planning and developing sustainable and safe logistics solutions.
- Knows supply chain process planning and optimisation methods and their practical application.
- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills

- Is able to recognise, systematically evaluate and manage the interrelationships and impact mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Able to control and develop storage and transport processes related to dangerous goods, including the application of risk analysis and risk management procedures.
- Able to apply integrated knowledge in the areas of dangerous goods logistics processes, the machinery and equipment used to implement them, process theory, industrial production processes and related digital technologies.
- Able to define logistics systems, warehouses and transport infrastructures for dangerous goods, as well as to manage and operate them efficiently.

c) Attitude

- Open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility

- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Dr. Tamás Faludi, senior lecturer, PhD**

Lecturer(s) involved in teaching the subject, if any (*name, position, academic degree*): **-**

Subject name: **Data Security and Protection**	Credit: **4**

Subject category: **compulsory**

Theoretical or practical nature of the course, "training character": 75/25% (credit%)

Type of class: **lecture + practical session** and number of hours: **12+4** in the given semester,
Additional (*specific*) methods and characteristics applicable to the transfer of the given knowledge *(if any)*: -

Method of assessment (exam / term mark / other): **term mark**
Additional (*specific*) methods used in knowledge assessment *(if any)*: -

Place of the subject in the curriculum (semester): **2nd semester**

Prerequisites *(if any)*: -

Course description: concise yet informative description of the knowledge to be acquired

Aim of the subject:
During the course, students will learn about the basic concepts of computer data security and the related recommendations used in Hungary. The course covers computer malware, the most common causes of data loss, and protection against data loss. It clarifies knowledge related to encryption used in computer communication, such as public key infrastructure (PKI), digital signatures, certificates, their theory and use. It introduces the different security classifications (TCSEC, ITSEC) and their main characteristics.

Subject topics:
1) Information protection; protection against physical damage and data loss.
2) Common methods of identification.
3) Computer malware and its characteristics.
4) Network protection; firewall components; firewall protection structures.
5) Public key cryptography and its areas of application.
6) Security classes; high availability systems.

List of 2-5 most important *required* and *recommended* literature (notes, textbooks) with bibliographic data (author, title, publication data, (possibly pages), ISBN)

Required literature:
1. Alan G. Konheim: Computer Security and Cryptography, Wiley, ISBN 978 0 471 94783 7
2. John R. Vacca: Computer and Information Security Handbook, Elsevier, ISBN 978 0 128 03929 8
3. Bruce Schneier: Applied Cryptography, Wiley, ISBN 978 1 119 09672 6

Recommended literature:
1. Harold F. Tipton, Micki Krause: Information Security Management Handbook, Auerbach Publications, ISBN 0-8493-9829-0

List of the required professional competencies and competency elements *(knowledge, skills*, etc., *KKK 7*) to which the course typically contributes in a meaningful way

a) Knowledge
- Knows the storage and transport requirements for dangerous goods, as well as the relevant domestic and international regulations.
- Knows the basic principles of logistics system design and operation.
- Knows the digital tracking and management systems of logistics processes, including automated solutions.
- Knows the design and development options for sustainable and safe logistics solutions.

- Knows modern technologies and tools for warehousing, transport and supply chain management.
- Knows the tools and procedures for ensuring legal compliance in logistics systems.

b) Skills
- Able to recognise, systematically evaluate and manage the interrelationships and mechanisms of logistics processes related to the storage and transport of dangerous goods that arise during the operation of logistics systems.
- Is able to plan, operate and optimise logistics processes related to dangerous goods based on a systematic approach, taking into account safety and legal requirements.
- Able to apply integrated knowledge in the areas of logistics processes for dangerous goods, the machines and equipment used to implement them, process theory, industrial production processes and related digital technologies.
- Able to define logistics systems, warehouses and transport infrastructures for dangerous goods, as well as to manage and operate them efficiently.

c) Attitude
- Open and receptive to learning about, applying and authentically communicating professional and technological developments and innovations in the field of logistics systems and the handling of dangerous goods.
- Strives to enforce the requirements of sustainability, environmental awareness, safety, health protection and energy efficiency in the operation and development of logistics systems.
- It strives to carry out its work in a systematic and process-oriented manner, taking into account the complexity and interactions of logistics processes.

d) Autonomy and responsibility
- Takes the initiative in performing professional tasks, independently analyses challenges related to logistics systems and the handling of dangerous goods, and responsibly selects and applies relevant problem-solving methods.
- They take responsibility for developing sustainable and safe logistics solutions, with particular regard to environmental protection, health protection and minimising risks associated with dangerous goods.
- In their decisions, they take into account the principles of environmental protection, quality assurance, consumer protection, product liability, equal access, and their application, as well as occupational health and safety, technical, economic and legal regulations, and the basic requirements of engineering ethics.

Subject coordinator (*name, position, academic degree*): **Dr. György Wagner, associate professor, PhD**
Lecturer(s) involved in teaching the subject, if any (*name, position, academic degree*): **-**

Dangerous Goods Logistics Specialist Postgraduate Specialization Programme

Lecturers

Faculty of Mechanical Engineering and Informatics, Institute of Logistics:

Program coordinator: Prof. Dr. Tamás Péter, PhD, vice dean, head of institute, full professor

Subject coordinators:

Prof. Dr. Péter Tamás, PhD, vice dean, head of institute, full professor
Prof. Dr. Tamás Bányai, PhD, full professor
Prof. Dr. Ágota Bányainé Tóth, PhD, full professor
Dr. Ákos Cservenák PhD, senior lecturer
Dr. János Juhász, PhD, senior lecturer
Péter Kováts, technical assistant
Dr Péter Telek, PhD, associate professor
Dr. Péter Veres, PhD, associate professor
Dr. György Wagner, PhD, associate professor

Faculty of Economics, Institute of Management Sciences:

Dr. Tamás Faludi, PhD, senior lecturer

Hungária Veszélyesáru Mérnöki Iroda

Dr. György Sárosi, managing director

Trusty Business Management Ltd.

János Tálosi, Chief Executive Officer

Name of lecturer participating in foreign language training	academic degree/title	job title	proof(s) of foreign language proficiency sufficient for lecturing
Dr. Péter Tamás	PhD	full professor	48 conferences recorded in MTMT
Dr. Tamás Bányai	PhD	full professor	29 conferences recorded in MTMT
Dr. Ágota Bányainé Tóth	PhD	full professor	14 conferences recorded in MTMT
Zoltán Bencsik	-		6 conferences
Dr. Ákos Cservenák	PhD	senior lecturer	C1 level language exam
Dr. Tamás Faludi	PhD	senior lecturer	7 conferences recorded in MTMT
Dr. János Juhász	PhD	senior lecturer	8 conferences recorded in MTMT
Péter Kováts	-	technical assistant	6 conferences recorded in MTMT
György Kucsera	-		6 conferences
Dr. Gábor Lengyel	-		6 conferences
Éva Sárosi	-		6 conferences
Dr. György Sárosi	-	managing director	8 conferences
Dr. Ádám Tálosi			6 conferences
János Tálosi	-	CEO	6 conferences
Dr. Péter Telek	PhD	associate professor	27 conferences recorded in MTMT
Szabolcs Tóth			6 conferences
Dr. Péter Veres	PhD	associate professor	21 conferences recorded in MTMT
Dr. György Wagner	PhD	associate professor	7 conferences recorded in MTMT