Title of the course: Basics and knowledge in military technology	**Code: HKDID0001A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) and learning hours: Lecture 20 h/ Seminar: 0 h./ Consultation: 0 h

Knowledge assessment (colloquium/academic grade/ other): comprehensive exam

The course place in the curricula (in which semester): first semester

Pre-subject requirements *(if any)*: *none*

Description - **Knowledge:** Information and data on Doctoral School of Military Engineering of National University of Public Service (NUPS) based on NUPS and Hungarian Doctoral Council website. Research & development (R&D) in military technology, methodology and NATO aspects. Life cycle of military equipment. Actors and their functions in R&D activities. Quality assurance. Hungarian defense industrial base. Regulations. Military and military-technological databases. Case study: ÁRPÁD artillery fire control system.

Basics of multicriteria decision making (MCDM). Models of decision making. Analysis of main methodologies (PROMETHEE, ***Analytic Hierarchy Process,*** etc.). Comparison of military equipment using MCDM models. Case studies. Presentation of scientific findings achieved in PhD thesis related to this research topic.

Introduction to the GEPÁRD sniper rifle family. Basic ideas, development activities, field trials. Revelation of need for powerful sniper rifles, analysis of domestic possibilities. Accuracy, efficiency, capacity, and their technological implementation. Technological solutions adopted to reduce impact of reaction of high-performance shot. Reception and reputation of GEPÁRD rifle family in the international military-technological literature (eg. Jane's). Presentation of scientific findings achieved in PhD thesis related to this research topic.

History of Hungarian military technological development with special focus on the role of the Military Technical Institute. Framework, structure and organization of military technological research and development. It's role and operation in system of national defense. Presentation and interconnection between science and defense industry. Significant domestic defense technology development results and introduction of their project managers. Presentation of scientific findings achieved in PhD thesis related to this research topic.

Educational goal of subject - **Competencies:** PhD students to be acquainted with basics of military technology including details, milestones, processes and related areas. Students are supposed to acquire solid knowledge on methodologies, rules, regulations, specific data and information on armaments and research methods in this specific topic.

Required readings:

- NATO Logistics Handbook http://www.nato.int/docu/logi-en/logist97.htm
- Gyarmati József, Felházi Sándor, Kende György: Choosing the Optimal Mortar for an Infantry Battalion's Mortar Battery with Analytic Hierarchy Process using Multivariate Statistics. Brussels, Royal Military Academy, October 22-23. 2009. Conference organizer: NATO Research and Technology Organisation. Conference

on Decision Support Methodologies for Acquisition of Military Equipment. ISBN 978-92-837-0101-9. Originator's Reference: RTO-MP-SAS-080 AC/323(SAS-080)TP/298. http://www.cso.nato.int/abstracts.aspx

- Gyarmati József, Dr. Kende György, Rózsás Tamás, Dr. Turcsányi Károly: The Hungarian field artillery fire control system ARPAD and its comparison with other systems. AARMS (Academic and Applied Research in Military Science), 2002. Volume 1 Issue 1. 9-38.pp. http://www.zmne.hu/aarms/index.htm
- Földi Ferenc: Gepárd heavy rifle family. Haditechnika 1997 C+D Special Issue pp. 90-96. HU ISSN 0230-6891

Recommended readings:

Haditechnika 1997 C+D Special Issue pp. 58-112. HU ISSN 0230-6891

Recommended websites:

- Defense Industry Association of Hungary http://www.vedelmiipar.hu/?module=showpage&site=welcome&group=&menupath=&product=&lang=eng#
- NATO Standardization Agreements http://www.nato.int/docu/standard.htm
- The NATO Science & Technology Organisation homepage https://www.cso.nato.int/Main.asp?topic=22

Responsible for course (name, position, degree): Dr. Ferenc HAJDÚ, assistant professor, PhD

Other teachers (name, position, degree): Dr. Zsolt HAIG, professor, PhD; Dr. Ernő HEGEDŰS, assistant professor, PhD; Dr. György KENDE, professor, DSc

Title of the course: Safety of Dangerous Activities HKDID0002A	**Credits: 2**
Place of the course: HHK KMDI doctorial education	
Type of lessons and learning hours: Full time training 20 hours/ part time training 6 hours	
Knowledge assessment (exam/academic grade): midterm evaluation	
The course place in the curricula (in which semester): 1	
Pre-subject requirements *(if any)*: none	
Course description: The aim of the course is to provide students with a basic understanding of disaster management, organizational and legal regulation of domestic disaster management, the role of the Ministry of Defence in disaster management, related knowledge of civil protection, chemical safety, nuclear safety, industrial safety, environmental safety and fire protection.	
Course description: 1. The hierarchy of disaster management legislation. 2. Organization and tasks of disaster management. 3. The role of the Hungarian Defense Forces in disaster management. 4. Basic knowledge of environmental safety. 5. General civil protection knowledge. 6. Domestic system of fire protection. 7. The industrial security task and system of tools. 8. Basic chemical safety	
Competences: High level theoretical knowledge in the field of disaster management and environmental safety, carrying out independent activities in performing organizational, managerial and scientific tasks related to the relevant scientific field.	
Requirements: The prerequisite for signing the semester is that the student must report on the theoretical knowledge in a closed-class thesis. Signature is also subject to a minimum of 75% of full-time training, 50% of correspondence training, and at least a satisfactory assessment of the part-time assignment and dissertation. The students report on the subject knowledge in a consolidated examination. Compliance with the criterion requirement for further studies.	
Required readings: 1) United Nations. *Sendai Framework for Disaster Risk Reduction.* 2015. 2) Fairman; Mead; Williems: Environmental Risk Assessment. Monitoring and Assessment Research Centre, King's College London; ISBN 92-9167-080-4 3) Padányi, József ; Földi, László: Tasks and Experiences of the Hungarian Defence Forces in Crisis Management. BILTEN SLOVENSKE VOJSKE 17 : 1 pp. 29-46. , 18 p. (2015) 4) Lajos Kátai-Urbán: Handbook for the Implementation of the Basic Tasks of the Hungarian Regulation on „Industrial Safety" Budapest: Nemzeti Közszolgálati Egyetem, 2014. 73 p. (ISBN 978-615-5491-70-2)	

Recommended readings:

1) Padányi, József ; Halász, László ; Földi, László: Improving the CBRN defence of combat vehicles as a response to the challenges of climate change. ECONOMICS AND MANAGEMENT 7 : 3 pp. 31-38. , 8 p. (2013)
2) Restás Á.: A Model for Firefighting Managers Making Decisions in Emergencies Proceedings of the 11th Int'l Conf. on Naturalistic Decision Making Marseille, France, 21-24.05.2013.
3) Muhoray, Árpád: 10 th Anniversary of the Parallel Flood Control on the Danube and Tisza Rivers in Hungary in 2006. ACADEMIC AND APPLIED RESEARCH IN PUBLIC MANAGEMENT SCIENCE 15 : 1 pp. 31-36. , 6 p. (2016)

Responsible for course: Dr. habil. Lajos Kátai-Urbán PhD, associate professor

Other teachers: Prof. Dr. habil. László Földi, professor, Dr. habil. József Dobor assistant professor, PhD; Dr. Árpád Muhoray, PhD; Dr. habil. Ágoston Restás, associate professor PhD; Dr. habil. Gyula Vass associate professor, PhD

Title of the course: Critical Infrastructure Protection	**Code: HKDID0003A**	**Credits: 6**

Type of lessons and learning hours: lecture
full time training: 20
part time training: 12

Knowledge assessment: midterm evaluation

The course place in the curricula (in which semester): 1 semester

Pre-subject requirements *(if any)*: none

Course description:
Information society and its technical history. Infrastructures, information infrastructures, critical infrastructures and critical information infrastructures. Threats against the infrastructures. Cyberwarfare. Protection of critical infrastructure and information infrastructure. Information security.

Educational goal of subject - Competencies:
To give a general overview on the infrastructures, information infrastructures, critical infrastructures and critical information infrastructures.

Required readings:
1. Lewis, G. Ted: Critical Infrastructure Protection in Homeland Security. Wiley, 2015. ISBN 978-1-118-81763-6

Recommended readings:
1. Green Paper on a European Programme for Critical Infrastructure Protection. Brussels, 17.11.2005. COM(2005) 576 final
2. Kovács László: Possible methodology for protection of critical information infrastructures. in: HADMÉRNÖK IV:(3) pp. 310-322. (2009)

Responsible for course (name, position, scientific degree): Prof. dr. Laszlo Kovacs, professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Information operations	**Code: HKDID0004A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 14/4 hours / Seminar: 4/2 hours / Consultation: 2/- hours

Knowledge assessment (exam/academic grade): midterm evaluation (CE)

The course place in the curricula (in which semester): 1 semester

Pre-subject requirements *(if any)*: none

Course description:
Development of information society. IT revolution, trends of infocommunication technologies. Information enviroment of military operations. Modern military infocommuncation systems. Definition and interpretation of conventional and adaptive information superiority. Information-based warfare methodes. Network-based operational capabilities. Definition, interpretation and dimensions of information operations. Technical and cognitive capabilities of information operations. Information operations in the cyberspace.

Educational goal of subject - Competencies:
To give a general overview about the role of information and information superiority in the military operations, as well as make a basis of the information-based warfare methods focus on the information operations.

Required readings:

2. AJP-3.10 Allied Joint Doctrine for Information Operations. November, 2009 https://info.publicintelligence.net/NATO-IO.pdf
3. AJP-3.10 Allied Joint Doctrine for Information Operations. December, 2015
4. JP 3-13 Information Operations. 27. November, 2014 https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_13.pdf
5. Zsolt, Haig: Connections between cyber warfare and information operations AARMS Vol. 8, No. 2 (2009) 329–337
1. Haig Zsolt, Hajdu Veronika: New ways in the cognitive dimension of information operations. REVISTA Academiei Fortelor Terestre / Land Forces Academy Review XXII : 2 pp. 94-102. , 9 p. (2017)

Recommended readings:

3. Waltz, Edward: Information Warfare Principles and Operations, Artech House, 1998, ISBN 0-89006-511-X
4. Allen, Patric D.: Information operations planning, Artech House, 2007, ISBN 10: 1-58053-517-8
5. Toffler, Alvin: Third wave. Bantman, 1984, ISBN 0553246984

Responsible for course (name, position, scientific degree): Dr. Zsolt Haig, professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Theory and methodology of scientific research	**Code: HKDID0005A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 12/4 hours / Consultation: 8/2 hours

Knowledge assessment (exam/academic grade): term mark

The course place in the curricula (in which semester): 1. semester

Pre-subject requirements *(if any)*: none

Course description:
The concept system of the scientific research, the scientific cognition, introduction to the theory and practice of social science researches. Steps of professional and scientific research types from the idea to the published material, representative research strategies and tools. Online search and information processing. The institutional frames of EU and domestic researches, research ethics, the processing of professional literature from the Internet. The editing of scientific publications. Originality and plagiarism: the ethical requirements of the scientific activity. The evaluation, interpretation, publishing of the results of the personal researches. Analysis of the sources. The type of analyses. The peculiarities of military science researches. The evaluation aspects of analytic-nature researches.

Educational goal of subject - Competencies:
The aim of the subject is to form and develop the necessary skills in the students for the self-sufficient research work, and to get them acquainted the key elements of the research process. We urge the student to self-sufficient research during the course.

Required readings:

1. ECO, Umberto: How to write a thesis. Cambridge (MA): The MIT Press, 2015., ISBN 9780262527132
2. Thomas Kuhn: The Structure of Scientific Revolutions, The University of Chicago Press, 1996
3. Bousquet, Antoine: The Scientific Way of Warfare, Order and Chaos on the Battlefields of Modernity, Columbia University Press, 2009

Recommended readings:

4. Poincaré, Henri: The Value of Science, The Science Press, 1907
5. Popper, Karl: The Logic of Scientific Discovery, Routledge Classics, 2005
6. Poincaré, Henri: The Foundations of Science, The Science Press, 1921
7. Fuller, J. F. C.: The Foundations of the Science of War, Hutchinson and Co., A Military Classic Reprint, US. Army Command and General Staff Press, 1993
8. Henderson, G. F. R.: The Science of War, A Collection of Essays and Lectures 1881-1903, Longmans, Green and Co., 1912
9. Evola, Julius: The Metaphysics of War, Battle, Victory and Death in the World of Tradition, Arktos Media, 2011

Responsible for course (name, position, scientific degree): Dr. habil Hornyacsek Júlia PhD associate professor

Other teachers (name, position, scientific degree): -

Title of the course: Military Logistics	**Code: HKDID0006A**	**Credits: 6**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 16 hours / Practical lessons 4 hours

Knowledge assessment (exam/academic grade): midterm evaluation

The course place in the curricula (in which semester): 1st semester

Pre-subject requirements *(if any)*: -

Course description:

Historical overview of logistics**.** Main definitions of logistics (civilian and military understandings), similarities and differences. Basic (classical) logistic functions and processes. Functions, areas, aspects and types of logistics in NATO. Evolution of the logistic principles in NATO ("FACES" to "ACCES FAVOR"). Description of classes of supply in NATO. Structure of logistic organizations in NATO (Logistics Committee and its subordinated committees). Hierarchy of logistic documents in NATO (Strategic, operational and tactical level documents). Modes of multinational logistic support in NATO (LLN, LRSN, MILU, MLU and Contractors' support to operation). Comprehensive approach to supply chains. Role of information in business processes. Risk analysis and management in business processes. Security features of supply chains. NATO Operational Support Chain (OSC). Role of the Joint Logistic Support Group (JLSG) in military operations. Planning the operation, conduct the Logistic Estimate and the OSC Plan. The relationship between military logistics and the defence industry. The role of the defence industry in the military support chains and its challenges in the 21st century. Logistic reporting. Practical use of the Logistic Data Management Module of LOGF(A)S in NATO.

Educational goal of subject - Competencies:

Throughout the course, PhD students get acquainted with the historical bases of military logistics, the principles of NATO logistics, its sectoral and functional tasks. At the end of the course students will be able to interpret the operational mechanism of logistic support systems and get basic skills in military decision making process.

Required readings:

1. NATO (2012): NATO Logistics Handbook 2012. Brussels. Access also: http://www.nato.int/docu/logi-en/logistics_hndbk_2012-en.pdf ISBN 978-92-845-0190-8
2. Kress, Moshe: Operational Logistics. The Art and Science of Sustaining Military Operations Second Edition. Springer. Springer Cham Heidelberg New York Dordrecht London, ISBN 978-3-319-22674-3 (eBook), DOI 10.1007/978-3-319-22674-3
3. Torpe, George C: Pure Logistics. The Science of War Preparation. Introduction by Stanley L. Falk. National Defense University Press, Washington, DC, 1986. 140 p. Library of Congress Catalog Card Number 85-600593
4. National Strategy for Global Supply Chain Security. The White House. Washington, DC, 16 p. Access also: https://obamawhitehouse.archives.gov/sites/default/files/national_strategy_for_global_supply_chain_security.pdf
5. Gansler, Jacques S.: Democracy's Arsenal: Creating a Twenty-First-Century Defense Industry Cambridge, Mass: The MIT Press, 2011. ISBN: 9780262072991. 9780262525237. 9780262295260

Recommended readings:

1. NATO Standard AJP-4. Allied Joint Doctrine for Logistics. Edition B Version 1. 89 p. Published by the NATO Standardization Office (NSO).
2. Joint Doctrine Publication 4-00, Logistics for Joint Operations, July 2015, Development, Concepts and Doctrine Center, Ministry of Defence Shrivenham, Swindon, Wiltshire. Access also: www.gov.uk/mod/dcdc
3. Hartley, Keith: The Economics of Arms Agenda Publishing, 2017. ISBN 978-1-911116-23-3

Responsible for course (name, position, scientific degree): Attila Horváth, PhD, Dr. habil.

Other teachers (name, position, scientific degree): Balázs Taksás, PhD.

Title of the course: Basics of Military Science	**Code: HKDID0007A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **lecture/ 20 hours**

Knowledge assessment (exam/academic grade): **mid-term evaluation (five-grade scale)**

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
System of sciences and the military science. The history of the hungarian military thinking. Basic terms of military science. The system of military operations. Theories on war.

Educational goal of subject - Competencies:
In general he/she knows, understands and has an overview of the structure of military science, the full spectrum of national defence and the activities carried out by the armed forces.

Required readings:
Piehler, Kurt G. (ed.) (2013): Encyclopedia of Military Science. I-IV. Thousand Oaks (CA), SAGE, ISBN 9781412969338
Rácz, András (2015): Russia's Hybrid War in Ukraine: Breaking the Enemy's Ability to Resist. Helsinki, Finnish Institute of International Affairs, ISBN: 9789517694537
Szenes, Zoltán (2018): Military Security Today. New Threats, New Wars, New Theories. In: Finszter, G. – Sabjanics, I. (eds.): Security challenges in the 21st century. Budapest, Dialóg Campus Kiadó, pp. 69-104. , ISBN 978-615-5920-76-9
Recommended readings:
Collins, John M. (2002): Military Strategy. Principles, Practices, and Historical Perspectives. Brassey's Inc., Washington D.C. ISBN 1574884301

Responsible for course (name, position, scientific degree): Major Balázs FORGÁCS, associate professor, PhD.

Other teachers (name, position, scientific degree): –

Title of the course: Classics of military science	**Code: HKDID0008A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 14/4 hours / Seminar: 4/2 hours / Consultation: 2/- hours

Knowledge assessment (exam/academic grade): Midterm evaluation (CE)

The course place in the curricula (in which semester): 1. semester

Pre-subject requirements *(if any)*: none

Course description:
The life and work of the classics of the military science, their most important works, and their effect on the universal development. The subject gives a summary from the ancient time up to the second world war, puts mainly the European and American classics in front, as well as the outstanding Hungarian military scientists.

Educational goal of subject - Competencies:
Giving a general knowledge of the classical authors of the foundation of military science and their works. The students should get to know the life and work of the most important, most well-known classics of military science, to realize the connection between the principles of the works of the foundation of military science and the principles operative today.

Required readings:

1. Sun Tzu: The art of war. Oxford, UK: Oxford University Press, 1971, ISBN 0195014766
2. Clausewitz, Carl von: On War. New Jersey: Princeton University Pr., 1989, ISBN 0691018545
3. Jomini, Baron de: The art of war. Westport: Greenwood Pr., [É. n.],
4. Liddell Hart, B.H.: Strategy: the indirect approach. London: Faber and Faber, 1967

Recommended readings:

6. LAQUEUR, Walter: The Guerrilla Reader. A Historical Anthology. Philadelphia: Temple University Press, 1977., ISBN 0877220956

Responsible for course (name, position, scientific degree): Prof. Dr. Tamás Csikány, professor, DSc

Other teachers (name, position, scientific degree): Prof. Dr. Zoltánn Szenes, professor, PhD

Title of the course: Processing and publication of research data	**Code: HKDID0309A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 6/2 hours / Seminar: 4/2 hours / Consultation: 10/2 hours

Knowledge assessment (exam/academic grade): term mark

The course place in the curricula (in which semester): 2. semester is recommended (depends on the individual educational program)

Pre-subject requirements *(if any)*: none, but it is recommended to successfully fulfill the requirements of the theory and practice of scientific research.

Course description:
The aim of the course is to broaden the theoretical and practical framework of the subject "Theory and Practice of Scientific Research", which was already acquired and acquired, primarily - on a practical level. To this end, students will become familiar with the open and paid software used in military engineering, military and broader social science research, major statistical methods and applications, and the collection, management, processing and evaluation of primary data. The course focuses not only on teaching statistical formulas, but on understanding and practicing statistical terms / methods with the aim of promoting the professional-scientific career of students in military science and military technical schools.

Educational goal of subject - Competencies:
The goal is for students to be able to design, implement and evaluate the results obtained based on their theoretical knowledge and to write an independent study.

Required readings:

6. C.R. Kothari (2004): *Research Methodology. Methods and Techniques.* New Age International, New Delhi. 401 p. ISBN: 978-81-224-2488-1
7. Conrad Carlberg (2011): *Statistical Analysis.* Que Publishing, Indiana. 464 p. ISBN: 978-0-7897-4720-4
8. E. Joseph Billo (2007): *Excel for Scientists and Engineers.* Numerical Methods. Wiley & Sons, Hoboken. 454 p. ISBN: 978-0-47 1-38734-3

Recommended readings:

1. PSPP Users' Guide. https://www.gnu.org/software/pspp/manual/pspp.pdf

Responsible for course (name, position, scientific degree): Dr. Kollár Csaba PhD senior research fellow

Other teachers (name, position, scientific degree): Dr. Kollár Csaba PhD, Dr. habil Hornyacsek Júlia PhD associate professor

Title of the course: PhD Research - Methodology of Military Engineering	**Code: HKDID0319A**	**Credits: 2**

Where is the education: NUPS Doctoral School of Military Engineering

Type of lessons and learning hours (full-time training/part-time training): 20/6 hours

Knowledge assessment (exam/academic grade): term mark

The course place in the curricula (in which semester): II-IV. semester

Pre-subject requirements *(if any)*: none

Course description:
The aim of the course is to learn and develop creative research methodological concept related to the military engineering challenges of our age. This course familiarises the students with the theoretical and practical issues of Military Engineering, provide details on expertise of Research + Development + LifeCycle Logistics Support (R&D + LCLS) planing, organisation and implementation, as well as the course explains the factors, the procedures and methods that make military research difficult and risky.

Knowledge, theme structure:

1. The concept, place, role and specialties of military engineering knowledge, its relation to tactical expectations. Criterias for the effectiveness of R&D & LCLS.
2. The main stages in the history of the development of the military engineering vision. Expectations and requirements of modeling and experiment concept, steps, and its implementation rules.
3. The impact and possibilities of Artificial Intelligence, cognitive decision support systems on data collection, data analysis objectives and Military-Engineering-Requirement ("Statement of Work") change risk analysis.
4. Significance, organization and evaluation of military equipment/system tests, examinations and "in-situ" performance measurements.
5. The issues of individual and cooperation (domestic + international) works during R&D & LCLS.

Educational goal of subject - Competencies:
The student will be able to design and run military technical research, formulate research objectives, define methods and collect targeted materials. They get a comprehensive picture of the history of military research technology, its main milestones and peculiarities. They will be familiar with decision-making problems and ways of using collected results constructively.
High level of knowledge: > 80%; Proficiency: > 65%; Ability: > 51%.

Requirements:
There are two conditions for completing the semester:

1. During the semester, a mid-term assignment shall be completed, which qualification is based on a five-level assessment. Their detailed requirements, deadlines for completion and replacement are determined during the first session.
2. The teoretical knowledge must be shown in writen short exam at the end of the semester.

The condition for signing is also the attendance in a minimum of 75% of the clsasses in case of full-time training, 50% of the classes in correspondence training, and at least a sufficient level of assessment of the mid-term assignment and writen short exam. The results can be improved once during the diligence period.

Quality assurance methods:
Providing regular consultation opportunities, welcoming and incorporating student opinions and feedback into the educational process where possible. Continuous monitoring of new scientific results and methods related to the subject by studying the Hungarian and international literature and then incorporating them into the curriculum.

Required readings:

1. Sun Tzu: The Art of War, https://suntzusaid.com/
2. István, Balajti: Performance Measurements of the Radar "In Situ", In: IEEE (szerk.) Microwaves, Radar and Remote Sensing Symposium, 2008. MRRS 2008,Kiev,: Institute of Electrical and Electronics Engineers (IEEE), (2009) pp. 334-339.
3. Balajti, István ; Hajdú, Ferenc: Surprising Findings from the Hungarian Radar Developments in the Era of the Second World War, RADIO SCIENCE BULLETIN 358 : September pp. 82-108. , 27 p. (2016)

Recommended readings:

4. Carl von CLAUSEWITZ: On War, Amazon, ISBN-10: 0691018545
5. How to Write a Synthesis Essay; https://www.wikihow.com/Write-a-Synthesis-Essay
6. Decision Model: https://www.decision-making-solutions.com/decision_making_model.html
7. MathWorks: Teach with MATLAB and Simulink, „Provide hands-on learning experiences to analyze data, create models and simulate" systems. https://nl.mathworks.com/academia/educators.html?s_v1=30930&elqem=3065604_EM_ROW_DIR_20-04_NEWSLETTER_COVID-EDU-ENG&elqTrackId=adf3137f9cd8432a9d52a3681c074df5&elq=da7c0e9a01e24920b2fd60d3f027fbaa&elqaid=30930&elqat=1&elqCampaignId=11198 (Letöltés : 2020.04.25)

Responsible for course (name, position, scientific degree): Dr. Habil.István Balajti, CSc

Other teachers (name, position, scientific degree): none

Title of the course: Implementation of the FP tasks' new technical equipments and principles, opportunities of application of those	**Code: HKDID1103A**	**Credits: 6**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **Lecture 30/10 hours / Consultation 30/10 hours**

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): from the 2nd semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: This course is based on the common consolidated mods exam of subjects of two PhD schools (The Basics of Scientific Work and the Military Technical Knowledge I.) and on the common exam subject of the Military Engineering PhD School (the Military Technical Knowledge II.).

Course description:

Our goal is to familiarize the new equipment and their new practices of the Force Protection to the PhD students. In the course of it, we present the novel, the enhancing of survivability's regulations, their technical equipment, its grouping and principles of these.

The course covers the planning, organizing and implementing of FP tasks, both in war and non-war operations as well. The course details the theoretical and practical aspects of the development, upgrading of FP tasks too.

Educational goal of subject - **Competencies:**

During the course the PhD students could obtain the following competencies:

- analytical skills;
- application of theoretical knowledge;
- system approach;
- planning and organizing skills;
- thinking of alternatives.

Required readings:

6. STANAG 2394 Engr (Ed2) Land Force Combat Engineer Doctrine
7. Joint Forward Operations Base (JFOB) Force Protection Handbook. A publication of the Joint Staff J3 Deputy Directorate for Antiterrorism/Homeland Defense Antiterrorism/Force Protection Division. Second printing 2006.
8. Joint Contingency Operations Base (JCOB) Force Protection Handbook (GTA 90-01-010). A publication of the Joint Staff J3 Deputy Directorate for Antiterrorism/Homeland Defense Antiterrorism/Force Protection Division. October 2007.

Recommended readings:

1. "Force Protection key to Army XXI plan" – http://www.dtic.mil/armylink/news

2. Force Protection: antiterrorism, 1997. US Army Training and Doctrine Command- http://ftp.fas.org/irp/doddir/army
3. USFK 525-13: USFK Force Protection Program

Responsible for course (name, position, scientific degree): Dr. Tibor KOVÁCS (PhD)

Other teachers (name, position, scientific degree): -

Title of the course: Physical protection of military critical infrastructures	**Code: HKDID1106A**	**Credits: 6**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **Lecture 30/10 hours, Consultation 30/10**

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): from 2nd semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

Concept of military critical infrastructure, its items and features. Threats to military critical infrastructure. Sectorial requirements, tasks of administrative agencies and military organizations. Possibilities, methods of protecting military critical infrastructure and equipment of physical protection.

Educational goal of subject - Competencies:
To give a general overview about the different blasting equipment and technologies. PhD students may obtain the following competencies:

- analytical skills;
- application of theoretical knowledge;
- system approach;
- planning and organizing skills;
- thinking of alternatives.

Required readings:

1. STANAG 2280 Design Threat Levels And Handover Procedures For Temporary Protective Structures, MCLSB, 2008.
2. Commission of the European Communities: Green Paper on a European Programme for Critical Infrastructure Protection, Brussels, 17.11.2005 COM(2005) 576 final
3. NATO Parlamentary Assembly: 162 CDS 07 E rev 1 - The Protection Of Critical Infrastructures, http://www.nato-pa.int/Default.asp?SHORTCUT=1165
4. The Department of Defense Critical Infrastructure Protection (CIP) Plan, http://fas.org/irp/offdocs/pdd/DOD-CIP-Plan.htm
5. UFC 4-010-01 9 February 2012 Unified Facilities Criteria (UFC) DoD Minimum Antiterrorism Standards for Buildings, http://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_01.pdf
6. MC 472 NATO Military Concept for Defence Against Terrorism 2002. december

Recommended readings:

1. Center For Infrastructure Engineering Studies: Blast Resistance of Un-reinforced Masonry Walls Retrofitted with Fiber Reinforced Polymers, Department of Civil Engineering University of Missouri – Rolla, 2002.

2. Kovács Zoltán: Multifunctional engineer barriers., In: Semságné Kádár Márta (szerk.) New challenges in the field of military sciences 2007: International Scientific Conference : proceedings : 2. Electrical engineering and aviation. 146 p. , Budapest: Zrínyi Miklós Nemzetvédelmi Egyetem, 2007. pp. 1-5. (ISBN: 978-963-87706-0-8)
3. Szabó Sándor, Kovács Zoltán, Tóth Rudolf: Force protection solutions with HESCO Bastion Concertainer., Academic And Applied Research In Military Science 10:(1) pp. 31-59. (2011)
4. HARBER David: THE ANARCHIST ARSENAL, Improvised Incendiary and Explosives Techniques; Paladin Press Boulder, Colorado 1990. ISBN 0-87364-580-4; p. 112.

Responsible for course (name, position, scientific degree): Dr. Zoltán KOVÁCS associate professor, PhD

Other teachers (name, position, scientific degree):

Title of the course: Blasting tasks and technics	**Code: HKDID1211A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **Lecture 30/10 hours**

Knowledge assessment (exam/academic grade): **Final exam**

The course place in the curricula (in which semester): 2nd – 4th semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
The course of blast. General characteristics of explosives. Military and civilian explosives. Ignition of explosives. Shaped charges. Military blasting tasks and techniques. Planning, organizing and executing blasting tasks.

Educational goal of subject - Competencies:
To give a general overview about the different blasting equipment and technologies. PhD students may obtain the following competencies:

- analytical skills;
- application of theoretical knowledge;
- system approach;
- planning and organizing skills;
- thinking of alternatives.

Required readings:

1. STANAG 2394 Engr (Ed2) Land Force Combat Engineer Doctrine (2011)
2. VALTERS, William: A Brief History of Shaped Charges, 24th International Symposium on Ballistics, vol. 1, pp. 3–10, New Orleans, LA, 22–26 September 2008.
3. TM 9-1300-214 Military explosives technical Manual, Headquarters, Department of the Army, Washington DC, USA, 1984.
4. KÖHLER, J. – MEYER, R.: Explosives – Fourth, revised and extended edition, VCH Verlagsgesellschaft mbH, Wenheim, Federal Republic of Germany, 1993.

Recommended readings:

1. Flood- and ice-prevention with explosives. Bolyai Szemle Különszám: Symposium Proceedings "Defence Technology VIIth International Symposium" CD-ROM. Zrínyi Miklós Nemzetvédelmi Egyetem Bolyai János Katonai Műszaki Főiskolai Kar, pp. 1-8.
2. Using explosives and landmines for coutermobility tasks. Proceedings of the International Conference on Military Technologies 2009., University of Defense, Brno, 2009. pp. 149-159. (ISBN:978-80-7231-649-6)
3. HARBER David: THE ANARCHIST ARSENAL, Improvised Incendiary and Explosives Techniques; Paladin Press Boulder, Colorado 1990. ISBN 0-87364-580-4; p. 112.

Responsible for course (name, position, scientific degree): Dr. Zoltán KOVÁCS associate professor, PhD

Other teachers (name, position, scientific degree):

Title of the course: IED & VBIED survey and neutralization	**Code: HKDID1214A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **Lecture 30/10**

Knowledge assessment (exam/academic grade): **Final exam**

The course place in the curricula (in which semester): 2nd – 4th semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Improvised explosive devices. Main parts and characteristics os IED. Vehicle born improvised explosives devices. Tasks, equipment of IED & VBIED survey. Protective measures to defeat (improvised) explosive devices.

Educational goal of subject - Competencies:

To give a general overview about the IED & VBIED assets, possible protective and defensive measures. PhD students may obtain the following competencies:

- analytical skills;
- application of theoretical knowledge;
- system approach;
- planning and organizing skills;
- thinking of alternatives.

Required readings:

1. Kovács Zoltán, Daruka Norbert: IEDD: Improvised Explosive Device Disposal. International Conference in Military Technology Proceeding: ICMT'13, Brno: University of Defence, 2013. pp. 383-390. (ISBN:978-80-7231-917-6)
2. Counter-IED Smart Book Version 2.1, For Pre-deployment and Field Use; Kwikpoint; ISBN KP-MIL-GEN-FB01; p. 300.
3. Counter-IED Smart Guide, Visual Recognition of IED and HME Indicators; Kwikpoint; ISBN KP-MIL-GEN-FB04; p. 80.
4. Dismounted C–IED Smart-Book, Version 1.0 Dated 08 Nov. 2011, Joint IED Defeat Organization (JIEDDO) Joint Center of Excellence (JCOE)
5. IED SMART BOOK, 1st Edition CEXC-Afghanistan Combined Explosives Exploitacion Cell Current as of: 13 Sep. 2006.

Recommended readings:

1. JIEDDO – Joint Improvised Explosive Device Defeat Organization 2006, No.: 20110504-V1.
2. Afghan Counter IED Visual Awareness Guide, Visual Recognition of IED and HME Indikators; Kwikpoint ISBN K21-MIL-AF45
3. GONZALES Jo Jo: Death by Deception, Advanced Improvised Booby Traps; Paladin Press, Boulder Colorado. ISBN 0-87364-651-7; p.120.

4. HARBER David: THE ANARCHIST ARSENAL, Improvised Incendiary and Explosives Techniques; Paladin Press Boulder, Colorado 1990. ISBN 0-87364-580-4; p. 112.
5. KÖHLER, J. – MEYER, R.: Explosives – Fourth, revised and extended edition, VCH Verlagsgesellschaft mbH, Wenheim, Federal Republic of Germany, 1993.

Responsible for course (name, position, scientific degree): Dr. Zoltán KOVÁCS associate professor, PhD

Other teachers (name, position, scientific degree):

Title of the course: New tools for technical support of peace support operations.	**Code: HKDID1216A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **Lecture 30/10 hours**

Knowledge assessment (exam/academic grade): **Final exam**

The course place in the curricula (in which semester): in the 2nd – 4th semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: -

Course description:

With systematic, analytical skills we help those PhD students, who have chosen research areas from the military technical sciences. The course covers the tasks of peace support operations, the concept, goal and main tasks of engineer support of peacekeeping operations. This course gives an overview about the all tasks of engineer support of peace support operations.

Educational goal of subject - Competencies:

During the course the PhD students could obtain the following competencies:

- analytical skills;
- application of theoretical knowledge;
- system approach;
- planning and organizing skills;
- thinking of alternatives.

Required readings:

1. STANAG 2394 Engr (Ed2) Doctrine for Military Engineering
2. JP 3-34 Engineer Doctrine for Joint Operationts (2011)
3. ATP 300-34.40 General Engineering February 2015.

Recommended readings:

1. "Force Protection keyto Army XXI plan" – http://www.dtic.mil/armylink/news
2. Joint Tacticts, Techniques and Procedures 4-05, Operational Infrastructure - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/73187/jttp4_05_Op_Infra_Ed2.pdf
3. USFK 525-13: USFK Force Protection Program

Responsible for course (name, position, scientific degree): Dr. Tibor KOVÁCS honoured professor (PhD)

Other teachers (name, position, scientific degree): -

Title of the course: Physical protection of military critical infrastructures	**Code: HKDID1217A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **Lecture 30/10 hours**

Knowledge assessment (exam/academic grade): **Final exam**

The course place in the curricula (in which semester): 2nd – 4th semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

Concept of military critical infrastructure, its items and features. Threats to military critical infrastructure. Sectorial requirements, tasks of administrative agencies and military organizations. Possibilities, methods and equipment of protecting military critical infrastructure.

Educational goal of subject - Competencies:
To give a general overview about the different blasting equipment and technologies. PhD students may obtain the following competencies:

- analytical skills;
- application of theoretical knowledge;
- system approach;
- planning and organizing skills;
- thinking of alternatives.

Required readings:

1. STANAG 2280 Design Threat Levels And Handover Procedures For Temporary Protective Structures, MCLSB, 2008.
2. Commission of the European Communities: Green Paper on a European Programme for Critical Infrastructure Protection, Brussels, 17.11.2005 COM(2005) 576 final
3. NATO Parlamentary Assembly: 162 CDS 07 E rev 1 - The Protection Of Critical Infrastructures, http://www.nato-pa.int/Default.asp?SHORTCUT=1165
4. The Department of Defense Critical Infrastructure Protection (CIP) Plan, http://fas.org/irp/offdocs/pdd/DOD-CIP-Plan.htm
5. UFC 4-010-01 9 February 2012 Unified Facilities Criteria (UFC) DoD Minimum Antiterrorism Standards for Buildings, http://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_01.pdf
6. MC 472 NATO Military Concept for Defence Against Terrorism 2002. december

Recommended readings:

1. Center For Infrastructure Engineering Studies: Blast Resistance of Un-reinforced Masonry Walls Retrofitted with Fiber Reinforced Polymers, Department of Civil Engineering University of Missouri – Rolla, 2002.

2. Kovács Zoltán: Multifunctional engineer barriers., In: Semságné Kádár Márta (szerk.) New challenges in the field of military sciences 2007: International Scientific Conference : proceedings : 2. Electrical engineering and aviation. 146 p. , Budapest: Zrínyi Miklós Nemzetvédelmi Egyetem, 2007. pp. 1-5. (ISBN: 978-963-87706-0-8)
3. Szabó Sándor, Kovács Zoltán, Tóth Rudolf: Force protection solutions with HESCO Bastion Concertainer., Academic And Applied Research In Military Science 10:(1) pp. 31-59. (2011)
4. HARBER David: THE ANARCHIST ARSENAL, Improvised Incendiary and Explosives Techniques; Paladin Press Boulder, Colorado 1990. ISBN 0-87364-580-4; p. 112.

Responsible for course (name, position, scientific degree): Dr. Zoltán KOVÁCS associate professor, PhD

Other teachers (name, position, scientific degree):

Name of the subject: Possible ways of building protection against blast attacks	**Code: HKDID1218A**	**Credit: 3**

Type and No. of classes: **lectures 30/10 hours**[1]

Examination (*test / assignment / others*[2]): **Final exam**

Place in the curriculum (*No. of semester*): according to the student research plan

Prerequisites *(if any)*: **English intermediate level**

Description:

Lecture Topics:

The phenomenon of explosion, basic factors of destroying effect, characteristics of shock waves. Features of explosion effects to buildings. Basics of building constructions. Increasing security with architectural measures. Structural reinforcements. Methods and equipment of mechanical protection. Protection of military camps and facilities against blast attacks.

Objectives:

Develop a broad understanding of possible ways of protection of buildings against blast attacks. Gain sufficient knowledge to explosion effects and the way of protection against them. Get familiar with structural reinforcements. Showcase the way of protection of military camps and facilities against blast attacks.

Most important **required** and **recommended** literatures, studies, articles:

Required references:

1. Henry Wong Blast-Resistant Building Design Technology Analysis of its Application to Modern Hotel Design, WGA Wong Gregersen Architects Inc., March 3, 2002
2. Anatol Longinow, Ph.D and Farid Alfawakhiri Ph.D Blast resistance design with structural steel, Modern Steel Construction, October 2003
3. UFC 4-010-01, 9 February 2012 (Including Change 1, 1 October 2013) Unified Facilities Criteria (UFC) DoD Minimum Antiterrorism Standards for Buildings
4. J.E.Crawford, S. Lan: Design and implementation of protective technologies for improving blast resistance of buildings; Enhancing Building Security Seminar, March, 2005, Singapore
5. Pavel Manas – Zsuzsanna Balogh: The critical infrastructure protection – principles and practical approaches. Critical Infrastructure Protection Review Launch edition, 2017, ISSN 2516-0087 (print), ISSN 2516-0095 (on-line) pp. 46-51.

Recommended references:

1. Dr. Mueller Othmár – Dr. Hunyadi Ferenc – Lukács László: A robbantások elleni védekezés feladatai – jegyzet (BME[3] Mérnöktovábbképző Intézet, Budapest, 1993.)

[1] On campus/correspondence course
[2] E.g. midterm test
[3] BME – Budapest University of Technology and Economics

2. Dr. Mueller Othmár – Lukács László: Házilagos készítésű robbantó szerkezetek 1 - 5. fejezetek – jegyzet, ORFK[4] Országos Kiképző Központ, Budapest, 1994.
3. Balogh Zsuzsanna: Objektumok robbantásos cselekmények elleni védelmének lehetőségei – PhD értekezés, Katonai Műszaki Doktori Iskola, Budapest, 2013.
4. Balogh Zsuzsanna: Tisztes távolság – optimális védőtávolság bombamerényletek ellen, Repüléstudományi Közlemények, 2012. 2. szám, HU ISSN 1789-770X, p. 380-386.
5. Balogh Zsuzsanna – Szabó Lajos: Defense of public buildings against forcible entry (Complementary Research Results from Middle European Researches Area Kiadvány ISBN 978-80-8054-506-2 pp. 65-70.)

Instructor: LTC Zsuzsanna Balogh, PhD.

Secondary instructor: Prof. Dr. László Lukács, university instructor, CSc.;

[4] ORFK – State Police Headquarters

Title of the course: Blasting tasks and technics for iceflood protection	**Code: HKDID1412A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **Lecture 14/4 hours / Consultation: 6/2**

Knowledge assessment (exam/academic grade): **Academic grade**

The course place in the curricula (in which semester): from 2nd – 4th semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Technical assets of iceflood protection. Blasting techniques. Equipment of flood prevention organizations. Cooperation between civilian and military demolition groups.

Educational goal of subject - Competencies:
To give a general overview about the flood protection blasting tasks. PhD students may obtain the following competencies:

- analytical skills;
- application of theoretical knowledge;
- system approach;
- planning and organizing skills;
- thinking of alternatives.

Required readings:

1. STANAG 2394 Engr (Ed2) Land Force Combat Engineer Doctrine (2011)
2. Flood- and ice-prevention with explosives. Bolyai Szemle Különszám: Symposium Proceedings "Defence Technology VIIth International Symposium" CD-ROM. Zrínyi Miklós Nemzetvédelmi Egyetem Bolyai János Katonai Műszaki Főiskolai Kar, pp. 1-8.
3. TM 9-1300-214 Military explosives technical Manual, Headquarters, Department of the Army, Washington DC, USA, 1984.
4. KÖHLER, J. – MEYER, R.: Explosives – Fourth, revised and extended edition, VCH Verlagsgesellschaft mbH, Wenheim, Federal Republic of Germany, 1993.

Recommended readings:

1. JP 3-34 Engineer Doctrine for Joint Operationts (2011)
2. VALTERS, William: A Brief History of Shaped Charges, 24th International Symposium on Ballistics, vol. 1, pp. 3–10, New Orleans, LA, 22–26 September 2008.

Responsible for course (name, position, scientific degree): Dr. Zoltán KOVÁCS, associate professor, PhD

Other teachers (name, position, scientific degree):

Title of the course: Environmental aspects of military blasting tasks	**Code: HKDID1414A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 14/4 hours / Seminar: 4/1 hours / Consultation: 2/1

Knowledge assessment (exam/academic grade): academic grade

The course place in the curricula (in which semester): from 2nd – 4th semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Basic information about course of blast. Characteristics of blasting and its effect on environment. Charges and their characteristics. Environmental aspects of military blasting and demolition tasks. Technical and technological solutions to decrease damage to the environment.

Educational goal of subject - Competencies:
To give a general overview about the environmental aspects of balsting tasks. PhD students may obtain the following competencies:

- analytical skills;
- application of theoretical knowledge;
- system approach;
- planning and organizing skills;
- thinking of alternatives.

Required readings:

1. STANAG 2394 Engr (Ed2) Land Force Combat Engineer Doctrine (2011)
2. Flood- and ice-prevention with explosives. Bolyai Szemle Különszám: Symposium Proceedings "Defence Technology VIIth International Symposium" CD-ROM. ZMNE BJKMK, pp. 1-8.
3. TM 9-1300-214 Military explosives technical Manual, Headquarters, Department of the Army, Washington DC, USA, 1984.
4. KÖHLER, J. – MEYER, R.: Explosives – Fourth, revised and extended edition, VCH Verlagsgesellschaft mbH, Wenheim, Federal Republic of Germany, 1993.

Recommended readings:

1. Using explosives and landmines for coutermobility tasks. Proceedings of the International Conference on Military Technologies 2009., University of Defense, Brno, 2009. pp. 149-159. (ISBN:978-80-7231-649-6)
2. HARBER David: IMPROVISED LAND MINES, Their Employment and Destructive Capabilities; Paladin Press Book, Colorado, ISBN 0-87364-656-8; p. 88.
3. HARBER David: THE ANARCHIST ARSENAL, Improvised Incendiary and Explosives Techniques; Paladin Press Boulder, Colorado 1990. ISBN 0-87364-580-4; p. 112.

4. VALTERS, William: A Brief History of Shaped Charges, 24th International Symposium on Ballistics, vol. 1, pp. 3–10, New Orleans, LA, 22–26 September 2008.

Responsible for course (name, position, scientific degree): Dr. Zoltán KOVÁCS, associate professor, PhD.

Other teachers (name, position, scientific degree):

Title of the course: Theory, methodology and NATO aspects of R&D in military technology	**Code: HKDID2103A**	**Credits: 6**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture, 60 hours (full time training, Lecture, 20 hours (part time training).

Knowledge assessment (exam/academic grade): exam

The course place int he curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any):* *not any*

Course description:

Logistics, research and development (R&D). Standardization, quality assurance, contracting, trials and testing. Theory and methodology of research and development in military technology. Basics, phases and practice of military R&D. Participants of R&D and their tasks. Cutting edge technologies. NATO Science and Technology Organization. Life cycle, milestones. Phased Armaments Programming System (PAPS). Hungarian Defense Industry. Multicriteria Decision Making. Árpád artillery fire control system. Árpád comparison to other artillery systems. NATO quality assurance. Internet research methods. Military technology databases (Jane's, Proquest Military). Military journals. Technology forecast. NATO Science and Technology Strategy.

Educational goal of subject – Competencies:

PhD students get familiar with basics and details of defense industry, research, development and technology methodologies and practices.

Required readings:

- Gyarmati József, Felházi Sándor, Kende György: Choosing the Optimal Mortar for an Infantry Battalion's Mortar Battery with Analytic Hierarchy Process using Multivariate Statistics. Brussels, 2009, Royal Military Academy. Conference on Decision Support Methodologies for Acquisition of Military Equipment. ISBN 978-92-837-0101-9. RTO-MP-SAS-080. URL: http://www.rta.nato.int/Pubs/RDP.asp?RDP=RTO-MP-SAS-080
- Gyarmati József, Dr. Kende György, Rózsás Tamás, Dr. Turcsányi Károly: The Hungarian field artillery fire control system ARPAD and its comparison with other systems. *AARMS (Academic and Applied Research in Military Science), 2002. Volume 1 Issue 1. 9-38.pp.* http://www.zmne.hu/aarms/index.htm
- Hangya Gábor, Kende György: Modern methods of research and analysis in military technology. *AARMS (Academic and Applied Research in Military Science), 2004. Volume 3 Issue 3. 459-472.pp.* http://www.zmne.hu/aarms/index.htm

Recommended readings:

- NATO Standardization Agreements http://www.nato.int/docu/standard.htm
- The NATO Science & Technology Organisation homepage http://www.sto.nato.int
- NATO Logistics Handbook http://www.nato.int/docu/logi-en/logist97.htm

Responsible for course (name, position, scientific degree): Prof. Dr. György Kende, colonel retired, DSc

Other teachers (name, position, scientific degree): -

Title of the course: **Past, present and future of the Hungarian R&D in military technology**	**Code: HKDID2204A**	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture, 30 hours, (full time training) Lecture, 10 hours,(part time training).

Knowledge assessment (exam/academic grade): exam

The course place int he curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any):* *not any*

Course description:
Logistics, research and development (R&D). Standardization, quality assurance, contracting, trials and testing. Theory and methodology of research and development in military technology. Basics, phases and practice of military R&D. Participants of R&D and their tasks. Cutting edge technologies. Hungarian Defense Industry. Multicriteria Decision Making. Árpád artillery fire control system. Árpád comparison to other artillery systems. Internet research methods. Military technology databases (Jane's, Proquest Military). Military journals. Visiting a Hungarian industrial base.

Educational goal of subject – Competencies:

PhD students get familiar with basics and details of Hungarian defense industry, research, development and technology methodologies and practices.

Required readings:

- Defense Industry Association of Hungary. Homepage. http://www.vedelmiipar.hu/?module=showpage&site=welcome&group=&menupath=&product=&lang=eng Downloaded 16 April 2016
- Gyarmati József, Felházi Sándor, Kende György: Choosing the Optimal Mortar for an Infantry Battalion's Mortar Battery with Analytic Hierarchy Process using Multivariate Statistics. Brussels, 2009, Royal Military Academy. Conference on Decision Support Methodologies for Acquisition of Military Equipment. ISBN 978-92-837-0101-9. RTO-MP-SAS-080. URL: http://www.rta.nato.int/Pubs/RDP.asp?RDP=RTO-MP-SAS-080
- Gyarmati József, Dr. Kende György, Rózsás Tamás, Dr. Turcsányi Károly: The Hungarian field artillery fire control system ARPAD and its comparison with other systems. *AARMS (Academic and Applied Research in Military Science), 2002. Volume 1 Issue 1. 9-38.pp.* http://www.zmne.hu/aarms/index.htm

Recommended readings:

- NATO Logistics Handbook http://www.nato.int/docu/logi-en/logist97.htm
- Hangya Gábor, Kende György: Modern methods of research and analysis in military technology. *AARMS (Academic and Applied Research in Military Science), 2004. Volume 3 Issue 3. 459-472.pp.* http://www.zmne.hu/aarms/index.htm
- Jane's

Responsible for course (name, position, scientific degree): Prof. Dr. György Kende, colonel retired, DSc

Other teachers (name, position, scientific degree): -

Title of the course: **Military related R&D experimentation-planning – case-studies**	**Code: HKDID2224A**	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture, 30 hours, (full time training) Lecture, 10 hours, (part time training).

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any):* *preferred master of science (engineer)*

Course description:
Role of research and development (R&D) in the lifecycle of military equipment. Theory and methodology of R&D in military technology. Phases and practice of military R&D. Participants of R&D and their tasks. Case-studies in field of military related R&D experimentation-planning regarding the cutting edge technologies. Visiting a Hungarian industrial base.

Educational goal of subject – Competencies:

PhD students get familiar with basics and details of Hungarian defence industry, research, development and technology methodologies and practices, mainly in field of experimentation-planning.

Required readings:

- Defence Industry Association of Hungary. Homepage. http://www.vedelmiipar.hu/?module=showpage&site=welcome&group=&menupath=&product=&lang=eng (Downloaded 16 June 2018)
- András GACHÁLYI, Gábor GYULAI: Effects of different decorporating agents on the whole–body retention of radioisotopes *AARMS (Academic and Applied Research in Military Science), 2014. Volume 13 Issue 2. 267-275.pp*
- András GACHÁLYI, Gábor GYULAI: Personal Radiotoxicological (First Aid) Kit. *AARMS (Academic and Applied Research in Military Science), 2014. Volume 13 Issue 2. 305-312.pp. http://archiv.uni-nke.hu/uploads/media_items/aarms-2014-2-gachalyia.original.pdf* (Downloaded 16 June 2018)

Recommended readings:

- NATO Logistics Handbook https://www.nato.int/docu/logi-en/logistics_hndbk_2012-en.pdf (Downloaded 16 June 2018)
- Hangya Gábor, Kende György: Modern methods of research and analysis in military technology. *AARMS (Academic and Applied Research in Military Science), 2004. Volume 3 Issue 3. 459-472.pp.*
- Gyulai Gábor, Kende György: Life cycle of military technology equipment – the Hungarian practice (szakcikk; Hadmérnök XIII. Évfolyam 4. szám – 2018. december; 67-74 oldal (ISSN 1788-1919));
- URL: http://www.hadmernok.hu/184_04_gyulai.pdf

Responsible for course (name, position, scientific degree): Dr. Gábor GYULAI, colonel retired, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Effects of a generational modernization in the HDF on Force Readiness	**Code HKDID2233A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture, 30 hours, (full time training) Lecture, 10 hours,(part time training).

Knowledge assessment (exam/academic grade): exam

The course place int he curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any):* *not any*

Course description: History of warfare has undergone several paradigm changes. Causes and conditions of a generational technological modernization on the national and international industry base. Effects of innovation on warfare. Causes and casualities of digital transformation, and management methods to build a system of transformation. Innovation strategy of the Armed Forces and method of radical innovation. The role of the National Industrial Base in the defence technology research and development.

Educational goal of subject – Competencies:

Gains a general understanding in the generations of warfare with a special focus on the interrelated technical and organizational challenges. Understand the paradigm changes and the challenges presented on the human aspect during Force Modernization. Gets a general overview of the Innovation Toolkit and various methods which can support a Defense Innovation Strategy. General understanding of the digital transformation principles, and its effects on the organizational culture. Has an oveview of the National Industrial Base, and its role in the technological paradigm change.

Required readings:

- Imre Porkolab - Ben Zweibelson: Designing a NATO to Think Differently for 21st Century Complex Challenges, Defence Review 2018/1. ISSN: 2060-1506
- MoD, National Security Through Technology: Technology, Equipment, and Support for UK Defence and Security, Cm 8278 London: The Stationery Office, 2012. ISBN 978-0-10-182782-9
- Robert Work: 'The Third Offset Strategy and America's Allies and Partners', speech given at RUSI, 10 September 2015. ISSN: 0307-1847

Recommenden readings

- Sydney J Freedberg: 'Centaur Army: Bob Work, Robotics, and the Third Offset Strategy', Breaking Defense, 9 November 2015. ISBN-10-3746013577
- Adam Jay Harrison: The Pentagon's Pivot: How Lead Users Are Transforming Defense Product Development, Defense Horizons, 2017. augusztus. ISBN 978-0-16-094499-4
- Imre Porkoláb: Counter Terrorism Exchange Vol 3 No 3, Aug 2013, When the Goldfish meets the Anaconda: A modern fable on unconventional leadership. Internet:
- https://globalecco.org/when-the-goldfish-meets-the-anaconda-a-modern-fable-on-unconventional-leadership

Tantárgy felelőse (*név, beosztás, tud. fokozat*)**: Dr. Porkoláb Imre ezredes, PhD**

Tantárgy oktatásába bevont oktató(k), ha vannak (*név, beosztás, tud. fokozat*)

Title of the course: **Life cycle of military technology equipment**	**Code: HKDID2234A**	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture, 30 hours, (full time training) Lecture, 10 hours, (part time training).

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any):* *preferred master of science (engineer)*

Course description:

General presentation of the life-cycle of military equipment using a flowchart. The relationship between the elements of the process and the logic of their construction. General principles and regularities through specific examples. This course is recommended for students who deal with the logistical tasks of military equipment at managerial level. Visit a military company.

Educational goal of subject – Competencies:

By presenting examples that are relevant to the students' interest, this course prepares students to work on the most appropriate care and maintenance topics for the given devices, groups of devices, and to draw appropriate conclusions from the operational experience . By getting to know the process in detail, the course enables students to make forward-looking suggestions based on experience.

Required readings:

- Defence Industry Association of Hungary. Homepage. http://www.vedelmiipar.hu/?module=showpage&site=welcome&group=&menupath=&product=&lang=eng (Downloaded 16 June 2018)
- Hangya Gábor, Kende György: Modern methods of research and analysis in military technology. *AARMS (Academic and Applied Research in Military Science), 2004. Volume 3 Issue 3. 459-472.pp.* http://archiv.uni-nke.hu/downloads/aarms/docs/Volume3/Issue3/pdf/14hang.pdf (Downloaded 16 June 2018)
- Gyulai Gábor, Kende György: Life cycle of military technology equipment – the Hungarian practice (szakcikk; Hadmérnök XIII. Évfolyam 4. szám – 2018. december; 67-74 oldal (ISSN 1788-1919)); URL: http://www.hadmernok.hu/184_04_gyulai.pdf

Recommended readings:

- NATO Logistics Handbook https://www.nato.int/docu/logi-en/logistics_hndbk_2012-en.pdf (Downloaded 16 June 2018)

Responsible for course (name, position, scientific degree): Dr. Gábor GYULAI, colonel retired, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Theory and practice of electronic warfare	**Code: HKDID3101A**	**Credits: 6**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 40/12 hours / Seminar: 12/4 hours / Consultation: 8/4 hours

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2. semester

Pre-subject requirements *(if any)*: none

Course description:
Basic concepts, categories of electronic warfare (EW) and its connections. Principles and methods of electronic reconnaissance and electronic support measures. Electronic support measures systems. Methods of electronic countermeasures. Basic of electronic jamming. Guided weapons. Directed energy weapons. Electronic countermeasures systems. Principles and methods of electronic protection measures (EPM). EPM of the radar systems as an example. Electronic warfare in army and air force operations. Electronic warfare in the cyberspace.

Educational goal of subject - Competencies:
To give a general overview about the role of electronic warfare in the military operations, as well as make a basis of the electronic warfare.

Required readings:

1. FM 3-36 Electronic Warfare. 2012. http://fas.org/irp/doddir/army/fm3-36.pdf
2. JP 3-13.1 Electronic Warfare. 08 February 2012. https://info.publicintelligence.net/JCS-EW.pdf
3. Haig, Zs.: Convergence between signals intelligence and electronic warfare support measures. Land Forces Academy Review Vol. XIX.:(Nr. 3. (75)) pp. 327-335. (2014) http://www.armyacademy.ro/reviste/rev3_2014/HAIG.pdf
4. Haig, Zs.: Intelligence and electronic warfare on the digital battlefield. Hadmérnök 4. évf.:(3. sz.) pp. 258-264. (2009) http://www.hadmernok.hu/2009_3_haig.pdf

Recommended readings:

7. Adamy, D.: EW101 A First Course in Electronic Warfare. Artech House, 2001.
8. Ryan, M. J. – Frater, M. R.: Tactical communications for the digitized battlefield. Artech House, 2012

Responsible for course (name, position, scientific degree): Dr. Zsolt Haig, professor, PhD

Other teachers (name, position, scientific degree): Dr. habil. Balajti István ret. LtCol. CSc.

Title of the course: Information infrastructures	**Code: HKDID3107A**	**Credits: 6**

Type of lessons and learning hours: lecture
full time training: 60
part time training: 20

Knowledge assessment: exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Information society and its technical history. Infrastructures, information infrastructures, critical infrastructures and critical information infrastructures. Threats against the information infrastructures. Cyberwarfare. Protection of critical information infrastructure. Information security.

Educational goal of subject - Competencies:
To give a general overview on the infrastructures, information infrastructures, critical infrastructures and critical information infrastructures.

Required readings:

1. Lewis, G. Ted: Critical Infrastructure Protection in Homeland Security. Wiley, 2015. ISBN 978-1-118-81763-6

Recommended readings:

1. Green Paper on a European Programme for Critical Infrastructure Protection. Brussels, 17.11.2005. COM(2005) 576 final
2. Kovács László: Possible methodology for protection of critical information infrastructures. in: HADMÉRNÖK IV:(3) pp. 310-322. (2009)

Responsible for course (name, position, scientific degree): Dr. Laszlo Kovacs, professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Cyber terrorism	**Code: HKDID3108A**	**Credits: 6**

Type of lessons and learning hours:
full time training: 60
part time training: 20

Knowledge assessment: exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
History of terrorism. IT in terrorism. IT tools and methods of terrorism. Threats of cyber terrorism. Portection against cyberterrorism.

Educational goal of subject - Competencies:
To give a general overview on cyber terrorism.

Required readings:

1. Haig Zsolt, Kovács László: New way of terrorism: Internet- and cyber-terrorism. in: Academic and Applied Research in Military Science 6:(4) pp. 659-671. (2007)
2. Colarik, A. (2006): Cyber Terrorism: Political and Economic Implications. IGI Global, ISBN 978-1599040219
3. Janczewski, L. (2005): Managerial Guide for Handling Cyber-Terrorism and Information Warfare. Information Science Reference, ISBN 978-1591405832

Recommended readings:

1. Council of Europe: Cyberterrorism: The Use of the Internet for Terrorist Purposes Terrorism and Law. Council of Europe, 2007. ISBN 9287162263, 9789287162267

Responsible for course (name, position, scientific degree): Prof. dr. Laszlo Kovacs, professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Quasi Monostatic – "RF network centric" Air Defence Systems (ADS)	**Code: HKDID3116A**	**Credits: 6**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 40/12 hours / Seminar: 12/4 hours / Consultation: 8/4 hours

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*:

Course description:
Basic system characterization and performances measures of the Quasi Monostatic - "RF network centric" Air Defence Systems (ADS) and its subsystems in Electronic Warfare (EW) condition. Get relevant, scientifically proven viewpoint and knowledge, which allows determination of:

1. Basic ADS, tasks and its emerging threats; 2. Theoretical analysis on ADS Operation in EW space; 3. EPM/ECCM analysis of radar systems and its modernization requirements; 4. The essence of modern ADS requirements; 5. Requirements, risk and cost estimation, analysis of modern ADS Life Cycle Support.
2. The subject gives solid foundation for understanding of ADS related:

- Quasi Monostatic radar systems` multitasking, characteristic and Radar Trade-Offs;
- Related main system parameters such as: Blake chart and Performance-Driven Specifications, "RF network centric", Passive Radar systems are included, radar technical capabilities and performance calculation.
- Promising scientific findings based on measurement and/or simulation results.

Educational goal of subject - Competencies:
It gives overview on latest, emerging ADS EPM/ECCM technology and its orientation with knowledge on modern SW radar/radio technology, signal processing, IT networks.

Required readings:

1. David K Barton: Radar System Analysis and Modeling. Boston,London, Artech House, 2005
2. Balajti István: Short Study on Performances of Air Surveillance Augmented by Twin Radars ACADEMIC AND APPLIED RESEARCH IN PUBLIC MANAGEMENT SCIENCE 13:(1) pp. 1-16. (2014) (ISBN 1588 8789
3. Istvan Balajti, Gyorgy Kende, Ed Sinner Increased importance of VHF radars in Ground - Based Air Defense, IEEE AEROSPACE AND ELECTRONIC SYSTEMS MAGAZINE 27:(1) pp. 4-18. (2012)

Recommended readings:

1. SKOLNIK: RADAR Handbook, Third Edition, Chapter 6, Mc Graw Hill, 2008,
2. A. De Martino: Introduction to Modern EW Systems, Second Edition, Artech House, 2018, ISBN-13: 978-1630815134,

Responsible for course (name, position, scientific degree): Dr. Balajti István CSc.

Other teachers (name, position, scientific degree): -

Title of the course: Bases of military system's modeling	**Code: HKDID03201A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): : lect.: 15/5; sem.: 8/4; cons..: 7/1.

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*:

Course description:

Bases of general system theory.

Universal model of military system

- inputs
- outputs

Model of armed combat

- environment
- purpose
- subsystems

Special system models

- military robots
- terrorist systems

Educational goal of subject - Competencies:
Creating cybernating sketch model of military tools, systems and processes.

Required readings:

1. Gy. Seres: Bases of military system modeling, http://www.drseres.com/ceepus/
2. Gy. Seres: Military technology comes from club to attack/defense robots by Research and Development (R&D). AARMS, VOL. 3, NO. 3 (2004) 361–372 HTTP://DRSERES.COM/PUBLIK/PDF/R_AND_D.PDF

Recommended readings:

1. Churchman, W.C. (1968) The Systems Approach, Delta, New York, NY,
2. Kis Márta, Seres György: Model of an E-Learning Research Network, Journal of Applied Multimedia 1/XI2016/, pp. 21-28., http://www.jampaper.eu/Jampaper_E-ARC/No.1_XI._2016_files/JAMPAPER160103e.pdf

Responsible for course (name, position, scientific degree): Dr. György Seres, associate professor (ret.), DSc.

Other teachers (name, position, scientific degree):

Title of the course: ICT basis of interactive knowledge transfer	**Code: HKDID3219A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester

Pre-subject requirements *(if any)*: basic ICT skills

Course description: Data, information, knowledge. Knowledge modul. Basic knowledges. Media, multimedia, interactivity. Efficiency of knowledge transfer. Special hardware tools of e-learning. Special software tools of e-learning. Elements of e-teaching. Elements of d-learning. Design of e-curriculums. Design of e-tests.

Educational goal of subject - Competencies:

To give a general overview about hardware and software tools of e-learning and design of e-learning or d-learning materials.

Required readings:

1. György Kende - György Seres - Ildikó Miskolczi: Let's learn easily a,nd quickly – lifelong, anytime, anywhere, Jampeper.eu, 3./III./2008. http://www.jampaper.eu/Jampaper_E-ARC/No.3_III._2008_files/JAM080302e.pdf
2. György Kende - György Seres - Ildikó Miskolczi - Gábor Hangya: Virtual Campus, http://drseres.com/publik/pdf/virtual_campus.pdf
3. György Seres - Antónia Berecz: Mobilizing e-learning, Journal of Applied Multimedia, 2./VIII./2013, pp.53-62 http://jampaper.eu/Jampaper_ENG/Issue_files/JAMPAPER130202e.pdf
4. Márta Kis, György Seres: Model of an E-Learning Research Network, Journal of Applied Multimedia 1./XI./2016 http://www.jampaper.eu/Jampaper_E-ARC/No.1_XI._2016_files/JAMPAPER160103e.pdf
5. György Seres: Is a test this test? , Journal of Applied Multimedia 1./XIII./2018, pp. 1-7. http://www.jampaper.eu/Jampaper_E-ARC/NO.1_XIII_2018/Entries/2018/9/4_Day_of_longboarding_files/JAMPAPER180101e.pdf

Recommended readings:

1. György Seres - Péter Gerő - Ildikó Miskolczi - Krisztina Fórika - Piroska Lengyel: Cloud Learning, CONFERENCE NEW CHALLENGES, 2010, 28-30 September, Budapest, ZMNDU, http://drseres.com/publik/pdf/cloudlearning.pdf
2. Seres, György: A life-to-life teaching-learning process as a system, JOURNAL OF APPLIED MULTIMEDIA 2/XIV/2019, pp. 21-25, http://www.jampaper.eu/Jampaper_E-ARC/No._2_XIV_2019/Entries/2019/10/24_A_life-to-life_teaching-learning_process_as_a_system_files/JAMPAPER190202e.pdf
3. Kis Márta, Seres György: Model of an E-Learning Research Network, JOURNAL OF APPLIED MULTIMEDIA 1/XI2016/, pp. 21-28., http://www.jampaper.eu/Jampaper_E-ARC/No.1_XI._2016_files/JAMPAPER160103e.pdf
4. György Seres: SysAdninLess Club, LAP LAMBERT Academic Publishing, 2020., ISBN-13: 978-620-2-51792-8, https://www.morebooks.de/gb/bookprice_offer_d92707e7f61327b936d6b35f39f6bd3daa262acf

Responsible for course (name, position, scientific degree): Dr. György Seres, assoc. professor (ret.), DSc.

Other teachers (name, position, scientific degree): -Tibenszkiné Dr. Fórika Krisztina, PhD

Title of the course: Information infrastructures	**Code: HKDID3221A**	**Credits: 3**

Type of lessons and learning hours: lecture
full time training: 30
part time training: 10

Knowledge assessment: exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Information society and its technical history. Infrastructures, information infrastructures, critical infrastructures and critical information infrastructures. Threats against the information infrastructures. Cyberwarfare. Protection of critical information infrastructure. Information security.

Educational goal of subject - Competencies:
To give a general overview on the infrastructures, information infrastructures, critical infrastructures and critical information infrastructures.

Required readings:

1. Lewis, G. Ted: Critical Infrastructure Protection in Homeland Security. Wiley, 2015. ISBN 978-1-118-81763-6

Recommended readings:

1. Green Paper on a European Programme for Critical Infrastructure Protection. Brussels, 17.11.2005. COM(2005) 576 final
2. Kovács László: Possible methodology for protection of critical information infrastructures. in: HADMÉRNÖK IV:(3) pp. 310-322. (2009)

Responsible for course (name, position, scientific degree): Dr. Laszlo Kovacs, professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Cyber terrorism	**Code: HKDID3222A**	**Credits: 3**

Type of lessons and learning hours:
full time training: 30
part time training: 10

Knowledge assessment: colloquium

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
History of terrorism. IT in terrorism. IT tools and methods of terrorism. Threats of cyber terrorism. Portection against cyberterrorism.

Educational goal of subject - Competencies:
To give a general overview on cyber terrorism.

Required readings:

1. Haig Zsolt, Kovács László: New way of terrorism: Internet- and cyber-terrorism. in: ACADEMIC AND APPLIED RESEARCH IN MILITARY SCIENCE 6:(4) pp. 659-671. (2007)
2. Colarik, A. (2006): Cyber Terrorism: Political and Economic Implications. IGI Global, ISBN 978-1599040219
3. Janczewski, L. (2005): Managerial Guide for Handling Cyber-Terrorism and Information Warfare. Information Science Reference, ISBN 978-1591405832

Recommended readings:

1. Council of Europe: Cyberterrorism: The Use of the Internet for Terrorist Purposes Terrorism and Law. Council of Europe, 2007. ISBN 9287162263, 9789287162267

Responsible for course (name, position, scientific degree): Dr. Laszlo Kovacs, professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Technical research of the infocommunication support in NATO multinational operations	**Code: HKDID3236A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 16/4 hours / Seminar: 10/4 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

To present the basics of NATO Crisis Response Operations (CRO) and the tasks of the Hungarian Defence Forces (HDF) in NATO multinational operations.

They become familiar with the communication and information support of multinational operations and their technical devices.

To present the principles of NATO CROs, the tasks of allied forces and the system of support.

Analyze the devices, technologies and systems that are used in the multinational operations by the HDF (Iraq, the Balkans, Afghanistan).

Educational goal of subject - Competencies:

The PhD student has to be able to:

- analyze the HDF communication and information system in multinational operations;
- prepare proposals for the communication devices.

Required readings:

1. STANAG 5048; The minimum scale of communications for the NATO land forces - Requirements, principles and procedures; NATO 1995.
2. MC 0593/1; The Minimum Level of C2 Services, Interoperability and Connectivity Required to Ensure Effective Coordination, C2 of Forces and Elements Deployed on Land, Involved in a NATO-led Operation; NATO 2014
3. Allied Joint Doctrine for Communication and Information System AJP-6 ; NATO 2011
4. Formats for orders and designations of timings, locations and boundaries STANAG 2014; NATO 2000.

Recommended readings:

1. Joint Communication System JP 6-0; US 2010.
2. Signal Support to Theater Operations Fm 6-02.45; US 2007.
3. Signal Soldier's Guide Fm 6.02-43; US 2009.

Responsible for course (name, position, scientific degree): Dr. Tibor Farkas, PhD

Other teachers (name, position, scientific degree): -

Subject: **Cloud computing and open source server solutions and their security**	Code: H**KDID3241A**	Credit: **3**
Lesson type and No.: lecture, consultation, full-time: 30 h; correspondence: 10 h		
Exam type: colloquium		
Location in the curriculum: **2-4. semester**		
Prerequisites *(if any)*: no		
Course Description: a brief but informative description of the competences and knowledge needed to be acquired for the completition of the course: **Knowledge:** Basics, types, implementations of cloud computing. Possible directions for development. Applications in the defense sector. Interpreting open source. Server types. Implementing different servers with open source applications. Theoretical and practical knowledge of security considerations. During the seminar, a research subtask related to the research topic of the doctoral student will be carried out Presentation of the results in the form of a seminar paper is expected. **Competence:** Acquisition of theoretical and practical knowledge in the field of cloud computing and open source servers, as well as acquisition of scientific publishing practice.		
List of the 3-5 most important required or recommended literature (notes, textbooks) with bibliographic data (author, title, edition details, pages, ISBN) **Required and recommended literature:** Andrew S. Tanenbaum, David J. Wetherall: Computer networks ISBN 978-963-545-529-4 Wireshark Network Analisys (Second edition) ISBN 978-1-893939-90-5 Brian W. Kernighan, Rob Pike: THE UNIX OS ISBN 963-16-0498-5 Mandatory and recommended literature is constantly updated, taken in consideration the results related to the topic, developments and plans of the Hungarian Armed Forces , as well as the available literature of the armies of NATO member states.		
Responsible for the subject: Dr. János, Rikk PhD		
Instructor involved in the teaching of the subject, if any: no		

Title of the course: Introduction to cryptography	**Code: HKDID3243A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 30/10

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester

Pre-subject requirements *(if any)*: none

Course description:

Simple substitution ciphers. Caesar cipher, Hill cipher, one-time pad. Basic concepts and methods in cryptanalysis. Discrete Logarithms and Diffie–Hellman key exchange protocol. Symmetric key cryptosystems. Stream ciphers and block ciphers. Public key cryptography. The ElGamal public key cryptosystem. Integer factorization problem and the RSA cryptosystem. Hash Functions and Applications. Hash collision attack and the birthday paradox. Zero-Knowledge Proofs.

Educational goal of subject - Competencies:

To give a general overview about the basics concepts and protocols of cryptography, as well as their mathematical background.

Required readings:

1. J. Hoffstein, J. Pipher, and J.H. Silverman: An introduction to mathematical cryptography. Springer, 2008.
2. G. Baumslag, B. Fine, M.Kreuzer, and G. Rosenberger: A Course in Mathematical Cryptography. De Gruyter, 2015.
3. L. V. Houtven: Crypto 101. 2017. https://www.crypto101.io
4. D. R. Stinson and M. B. Paterson: Cryptography: Theory and practice. Chapman & Hall/CRC Press, 2019.

Recommended readings:

1. D. Boneh and V. Shoup: A Graduate Course in Applied Cryptography. 2017 https://toc.cryptobook.us/
2. X. Wang, G. Xu, M. Wang, and X. Meng: Mathematical Foundations of Public Key Cryptography. Chapman & Hall/CRC Press 2016.
3. J. Katz and Y. Lindell: Introduction to Modern Cryptography. Chapman & Hall/CRC Press 2014.

Responsible for course (name, position, scientific degree): Dr. Gergely Székely, associate professor, PhD

Other teachers (name, position, scientific degree): –

Title of the course: "In Situ" Radar-, Electronic Protection Measures (EPM/ECCM), Performance Checks (RPC) for researchers	**Code: HKDID3246A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4 semester

Pre-subject requirements *(if any)*: Basic radar and EW theory

Course description:
Important of "in-situ" RPC, focused on EPM/ECCM, in moder radar logistic support. Challenges in complex radar diagnosis. Objectives of RPC and "in-situ" test results evaluation with scientifically proven criterias and their syntheses. Radar Blake chart calculations and Performance Checks-Driven Parameters. Applied in the field RPC concept and structure: System specific Built In Tests. EPM/ECCM and Antenna Performance characterisation and testing. Transmitter related; Receiver related; Signal and Data processing; Plot recording tests and its analysis defficulties. Requirements for practical realisations of test methods and equipments such as DRFM on drone platform. Test results and data base maintanence. Future grow of RSP.

Educational goal of subject - Competencies:
To give overview on the possibilities how to get the maximum available information regularly regarding a radar under "in-situ" tests within a minimum required downtime and cost. Highlight important of "in-situ" radar, EPM/ECCM performance tests for radar Life Cycle Support.

Required readings:

1. **BARTON, David K.** (2005): Radar system analysis and modeling. Boston, Artech House. 545 p. ISBN 1-580536-81-6
2. **BALAJTI, I. (2008):** Performance measurements of the radar "In Situ". In: Microwaves, Radar and Remote Sensing Symposium, MRRS 2008. Kiev, Ukraine, 22-24 September, 2008. p. 334-339
3. **BALAJTI, I. (2010):** Performance measurements of the radar "In Situ": Beam pointing and transmitter related issues. In: IEEE Radar Conference, Washington D.C, USA, 10-14 May 2010. p. 6-11.

Recommended readings:

1. A. De Martino: Introduction to Modern EW Systems, Second Edition, Artech House, 2018, ISBN-13: 978-1630815134.

Responsible for course (name, position, scientific degree): Dr. István Balajti CSc

Other teachers (name, position, scientific degree):

Title of the course: Modern technological and organizational processes in the management of battlefield infocommunication networks	**Code: HKDID3247A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 16/4 hours / Seminar: 10/4 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
To present the national and NATO organizational methods of battlefield military communication and information systems (CIS), and the modern communication and information equipments.
PhD students learn about the personal conditionality of the CIS management.
They become familiar with the survey methodology of communication needs in battlefield communication, and the features of modern communication devices and technologies related to the organizational methodology.

Educational goal of subject - Competencies:
The PhD student has to be able to plan military communication network , and become familiar with modern technology and organizational procedures.

Required readings:

1. STANAG 5048; The minimum scale of communications for the NATO land forces - Requirements, principles and procedures; NATO 1995.
2. MC 0593/1; The Minimum Level of C2 Services, Interoperability and Connectivity Required to Ensure Effective Coordination, C2 of Forces and Elements Deployed on Land, Involved in a NATO-led Operation; NATO 2014
3. Allied Joint Doctrine for Communication and Information System AJP-6 ; NATO 2011

Recommended readings:

1. Joint Communication System JP 6-0; US 2010.
2. Signal Support to Theater Operations Fm 6-02.45; US 2007.
3. Signal Support to Operations FM 6-02; US 2014.

Responsible for course (name, position, scientific degree): **Dr. Tibor Farkas, PhD**

Other teachers (name, position, scientific degree): -

Title of the course: Application of GIS in defence electronics systems	**Code: HKDID3407A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 6/2 hours / Seminar: 4/2 hours / Consultation: 10/2 hours

Knowledge assessment (exam/academic grade): term mark

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Basics of GIS. General overview of GIS systems. Data collection, data processing, data analysis processes in GIS systems. Applications of GIS in the defence electronics systems. GIS analysis. Radio wave propagation supported by GIS. GIS-based C2 systems.

Educational goal of subject - Competencies:
To give a general overview about the GIS in defence electronics systems. The result of this practical course is a manuscript in the context of GIS and electronics systems.

Required readings:

1. Prof. Tamás János; Fórián Tünde: Geoinformatics. Debreceni Egyetem, 2008. https://regi.tankonyvtar.hu/hu/tartalom/tamop425/0032_terinformatika/index.html
2. Li Qing: GIS Aided Radio Wave Propagation Modelling and Analysis. May 12, 2005. http://scholar.lib.vt.edu/theses/available/etd-05272005-140752/unrestricted/Thesis_LiQing.pdf

Recommended readings:

1. GIS in the Defense and Intelligence Communities, Volume 2. ESRI http://www.esri.com/library/brochures/pdfs/gis-in-defense-vol2.pdf

Responsible for course (name, position, scientific degree): Dr. Zsolt Haig, professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Ruggedized IT devices	**Code: HKDID3409A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 0/0 hours / Seminar: 0/0 hours / Consultation: 20/6

Knowledge assessment (exam/academic grade): term mark

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
During the research seminar, a research subtask – related to the application of ruggedized IT devices, and to the PhD research topic of the PhD student – will be conducted, guided by the teacher. The result of the seminar, and the basis of the evaluation is a seminar paper, similar in content and format to a scientific journal paper.

Educational goal of subject - Competencies:
To ensure progress in formulating research subtask objectives, in processing the relevant scientific literature, in formulating scientific results, and in presenting the results in accordance the basic requirements of scientific publications.

Required readings:
Recommended readings:
- as follows from the guided research nature of the research seminar, no specific literature can be given;

Responsible for course (name, position, scientific degree): Dr. Sándor Munk, prof. em., DSc

Other teachers (name, position, scientific degree): none

Title of the course: Personal and wearable IT devices	**Code: HKDID3410A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 0/0 hours / Seminar: 0/0 hours / Consultation: 20/6

Knowledge assessment (exam/academic grade): term mark

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
During the research seminar, a research subtask – related to the application of personal and wearable IT devices, and to the PhD research topic of the PhD student – will be conducted, guided by the teacher. The result of the seminar, and the basis of the evaluation is a seminar paper, similar in content and format to a scientific journal paper.

Educational goal of subject - Competencies:
To ensure progress in formulating research subtask objectives, in processing the relevant scientific literature, in formulating scientific results, and in presenting the results in accordance the basic requirements of scientific publications.

Required readings:
Recommended readings:
- as follows from the guided research nature of the research seminar, no specific literature can be given;

Responsible for course (name, position, scientific degree): Dr. Sándor Munk, prof. em., DSc

Other teachers (name, position, scientific degree): none

Title of the course: Information infrastructures	**Code: HKDID3415A**	**Credits: 2**

Type of lessons and learning hours: seminar
full time training: 20
part time training: 6

Knowledge assessment: academic grade

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Information society and its technical history. Infrastructures, information infrastructures, critical infrastructures and critical information infrastructures. Threats against the information infrastructures. Cyberwarfare. Protection of critical information infrastructure. Information security.

Educational goal of subject - Competencies:
To give a general overview on the infrastructures, information infrastructures, critical infrastructures and critical information infrastructures.

Required readings:

1. Lewis, G. Ted: Critical Infrastructure Protection in Homeland Security. Wiley, 2015. ISBN 978-1-118-81763-6

Recommended readings:

1. Green Paper on a European Programme for Critical Infrastructure Protection. Brussels, 17.11.2005. COM(2005) 576 final
2. Kovács László: Possible methodology for protection of critical information infrastructures. in: HADMÉRNÖK IV:(3) pp. 310-322. (2009)

Responsible for course (name, position, scientific degree): Dr. Laszlo Kovacs, professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Cyber terrorism	**Code: HKDID3416A**	**Credits: 2**

Type of lessons and learning hours:
full time training: 20
part time training: 6

Knowledge assessment: academic grade

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
History of terrorism. IT in terrorism. IT tools and methods of terrorism. Threats of cyber terrorism. Portection against cyberterrorism.

Educational goal of subject - Competencies:
To give a general overview on cyber terrorism.

Required readings:

1. Haig Zsolt, Kovács László: New way of terrorism: Internet- and cyber-terrorism. in: ACADEMIC AND APPLIED RESEARCH IN MILITARY SCIENCE 6:(4) pp. 659-671. (2007)
2. Colarik, A. (2006): Cyber Terrorism: Political and Economic Implications. IGI Global, ISBN 978-1599040219
3. Janczewski, L. (2005): Managerial Guide for Handling Cyber-Terrorism and Information Warfare. Information Science Reference, ISBN 978-1591405832

Recommended readings:

1. Council of Europe: Cyberterrorism: The Use of the Internet for Terrorist Purposes Terrorism and Law. Council of Europe, 2007. ISBN 9287162263, 9789287162267

Responsible for course (name, position, scientific degree): Prof. dr. Laszlo Kovacs, professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Internet-based IT Services	**Code: HKDID3419A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 0/0 hours / Seminar: 0/0 hours / Consultation: 20/6

Knowledge assessment (exam/academic grade): academic grade

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
During the research seminar, a research subtask – related to the Internet-based IT services, and to the PhD research topic of the PhD student – will be conducted, guided by the teacher. The result of the seminar, and the basis of the evaluation is a seminar paper, similar in content and format to a scientific journal paper.

Educational goal of subject - Competencies:
To ensure progress in formulating research subtask objectives, in processing the relevant scientific literature, in formulating scientific results, and in presenting the results in accordance the basic requirements of scientific publications.

Required readings:
Recommended readings:
- as follows from the guided research nature of the research seminar, no specific literature can be given;

Responsible for course (name, position, scientific degree): Dr. Sándor Munk, prof. em., DSc

Other teachers (name, position, scientific degree): none

Title of the course: Development trends in the deployable infocommunication and information system	**Code: HKDID3428A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 6/2hours / Seminar: 10/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): academic grade

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

To present the deployable communication and information system (CIS) of the modern armed forces, and the current field of the recent development.

To examine the future directions in technical development highlighted the experiences.

The PhD students become familiar with the battlefield CIS by interpretation of doctrinal, technical, and technologial development.

Educational goal of subject - Competencies:

The PhD student has to be able to:

- analyze the communication and information system;
- interpret the capability based approach development.

Required readings:

1. STANAG 5048; The minimum scale of communications for the NATO land forces - Requirements, principles and procedures; NATO 1995.
2. MC 0593/1; The Minimum Level of C2 Services, Interoperability and Connectivity Required to Ensure Effective Coordination, C2 of Forces and Elements Deployed on Land, Involved in a NATO-led Operation; NATO 2014
3. Allied Joint Doctrine for Communication and Information System AJP-6 ; NATO 2011
4. Formats for orders and designations of timings, locations and boundaries STANAG 2014; NATO 2000.

Recommended readings:

1. Joint Communication System JP 6-0; US 2010.
2. Signal Soldier's Guide Fm 6.02-43; US 2009.

Responsible for course (name, position, scientific degree): Dr. Tibor Farkas, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Issues of infocommunication capabilities, applications and technical equipment in the joint operations of the Hungarian Defense Forces	**Code: HKDID3429A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 6/2hours / Seminar: 10/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): academic grade

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
To present the:

-capabilities of communication suppport for joint forces;

-the capabilities of Communication and information System (CIS);

-and the requirements, needs by the commanders.

The Phd Students become familiar with the structure, capability of joint forces and features of their CIS and communication devices.

Educational goal of subject - Competencies:

The PhD student has to be able to analyze and to organize the CIS support of joint forces.

Required readings:

1. STANAG 5048; The minimum scale of communications for the NATO land forces - Requirements, principles and procedures; NATO 1995.
2. MC 0593/1; The Minimum Level of C2 Services, Interoperability and Connectivity Required to Ensure Effective Coordination, C2 of Forces and Elements Deployed on Land, Involved in a NATO-led Operation; NATO 2014
3. Allied Joint Doctrine for Communication and Information System AJP-6 ; NATO 2011

Recommended readings:

1. Signal Support to Theater Operations Fm 6-02.45; US 2007.
2. Signal Support to Operations Fm 6-02; US 2014.

Responsible for course (name, position, scientific degree): Dr. Tibor Farkas, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Cybersecurity in Public Administration	**Code: HKDID3431A**	**Credits: 2**

Type of lessons (lecture/seminar/practice/consultation) **and learning hours** (full time training/part time training): 6(FT), 2(PT); 14(Pr), 4(Pr)

Knowledge assessment (exam/academic grade): **academic grade**

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*:

Course description:
A country's social and economic operation depends on the information systems that we call critical information infrastructures. Information systems of the public administration are extremely critical, where secure operation is especially important. As cyber attacks are becoming more common, the risk level of such systems is getting higher. The goal of the course is to introduce the principles of cybersecurity and critical information infrastructure protection on a level that users of public information systems need to know.

Educational goal of subject - Competencies:

- Is able to see the current threats of cyberspace towards public administration,
- Is able to support its pulic administration organization in developing cyber defense capabilities;
- Is able to adequately support its public administration organization and external parties in dealing with cyber attacks.

Required readings:

1. Dr Katharina Ziolkowski (Ed.) (2014): Peacetime Regime for State Activities in Cyberspace

Recommended readings:

1. NATO CCDCOE (2018): Guide to Developing a National Cybersecurity Strategy

Responsible for course (name, position, scientific degree): Csaba Krasznay, associate professor, PhD

Other teachers (name, position, scientific degree):

Title of the course: Environmental Protection and Security	**Code:** HKDID4102A	**Credits:** 6

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 40/12 hours / Seminar: 12/4 hours / Consultation: 8/4

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: Military Technology

Course description:
Environmental protection and economics. Ecology, ecosystems. Legal environment of environmental protection, acts and other regulations. Environmental security. Environmental principles in the NATO. Air, water and soil quality management. Waste and hazardous waste management. Electromagnetic waves, vibration and noise protection. Environmental protection during military activities.

Educational goal of subject - Competencies:
To give a general overview about environmental protection, as well as make a basic knowledge of environmental security and related global threats and problems.

Required readings:

1. Rita Floyd, Richard A. Matthew: Environmental Security: Approaches and Issues, Routledge, 2013. ISBN 978-041-5538-99-2
2. Simon Dalby: Environmental security, University of Minnesota Press, 2002. p. 312, ISBN 978-0-8166-4026-3
3. Institutions for the Earth: Sources of Effective International Environmental Protection, Edited by Peter M. Haas, Robert O. Keohane and Marc A. Levy; MIT Press, 1993. p. 448, ISBN: 978-026-2581-19-6

Recommended readings:

1. Ackerman, Frank; Heinzerling, Lisa: Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection; Law Journal Library, Heinonline, https://heinonline.org/HOL/PrintRequest?collection=journals&handle=hein.journals/pnlr150&id=1567&print=section&div=42&ext=.pdf&format=PDFsearchable&submit=Print%2FDownload

Responsible for course (name, position, scientific degree): Prof. dr. László Földi, PhD

Other teachers (name, position, scientific degree): Prof. Em. László Halász, DSc

Title of the course: Chemical Safety	**Code:** HKDID4105A	**Credits:** 6

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 40/12 hours / Seminar: 12/4 hours / Consultation: 8/4

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Cefinition of chemical safety, Act 25/2000. and the national program of chemical safety. Chemical risk assesment and risk management. Categories of dangerousness and report obligations. The system of REACH regulation in the European Union and its implementation in Hungary. Effects and tasks emanating from the GHS/CLP regulations.

Educational goal of subject - Competencies:
To give advanced capabilities in safe handling of different hazardous chemicals.

Required readings:

1. Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), EC No 1907/2006.
2. CLP Regulation (for "Classification, Labelling and Packaging"), EC No 1272/2008

Recommended readings:

1. Globally Harmonized System of Classification and Labeling of Chemicals (GHS), United Nations Economic Commission for Europe, http://www.unece.org/trans/danger/publi/ghs/ghs_rev05/05files_e.html

Responsible for course (name, position, scientific degree): Prof. dr. László Földi, PhD

Other teachers (name, position, scientific degree): Prof. Em. László Halász, DSc

Title of the course: Weapons of mass destruction	**Code: HKDID4201A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Characteristics and Effects of CBRN Hazards. Environmental Effects. Chemical Hazards Characteristics and Effects. Biological Hazards Characteristics and Effects. Radiological Hazards Characteristics and Effects. Nuclear Hazards Characteristics and Effects. Principles of CBRN Defence. CBRN in the Operational Environment. Individual protection, collective protection. CBRN recce, CBRN decontamination.

Educational goal of subject - Competencies:
To give a general overview about the CBRN weapons and effects. To give knowledge about Fundamentals of CBRN Defence.

Required readings:

1. AJP-3.8 Allied Joint Doctrine for NBC, 2003.
2. STANAG 2112 Nuclear, biological and chemical reconnaissance, 2005.
3. Rezső Pellérdi - Tamás Berek: Redefining the CBRN risk assessment, AARMS - 2009 Vol 8. Issue12, pp. 159-172., 2009.

Recommended readings:

1. Berek Tamás: Conditions of an NBC exercise field creation ***HADMÉRNÖK*** **2:**(3) *pp. 4-8.* (2007)
2. L Halász, I Pintér, A Solymár: Remote sensing in the biological and chemical reconnaissance. ***ACADEMIC AND APPLIED RESEARCH IN MILITARY SCIENCE*** **1:**(1) *pp. 39-56.* (2002)
3. A Solymár, L Halász: Biological detection ***ACADEMIC AND APPLIED RESEARCH IN MILITARY SCIENCE*** **1:**(1) *pp. 57-62.* (2002)
4. Berek Tamás, Szabó Sándor: Hungarian establishing test of CBRN decontamination technologies from the aspect of CBRN decon platoon composition ***HADMÉRNÖK*** **9:**(2) *pp. 226-233.* (2014)
5. Halász László, Földi László, Padányi József: Climate change and CBRN defense ***HADMÉRNÖK*** **7:**(3) *pp. 42-49.* (2012)
6. Földi László: Current status of chemical and biological weapons' development, trends, possibilities and prospects HADMÉRNÖK 10 : 4 pp. 75-85. , 11 p. (2015)

Responsible for course (name, position, scientific degree): Dr. Tamas Berek associate professor, PhD

Other teachers (name, position, scientific degree):
László Halász, professor emeritus, DSc

Title of the course: Chemistry of toxic materials	**Code:** HKDID4202A	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Basics of toxicology. Active ingredients of chemical weapons. Types of chemical warfare agents: nerve agents (organophosphates, karbamates, highly toxic insecticides, binery nerve agents), blister agents (halogenated thioethers, nitrogene mustards, lewisite and its homologs), choking agents, generally toxic agents, non-lethal chemical agents (psychotoxic and somatic agents), herbicides, toxins.

Educational goal of subject - Competencies:
To achieve basic knowledge on the chemical structure and physico-chemical properties of chemical warfare agents, their production and chemical reactions, biological mode of action

Required readings:

1. Dr Timothy T. Marrs (Editor), Robert L. Maynard (Editor), Frederick Sidell (Editor): Chemical Warfare Agents: Toxicology and Treatment, 2007, ISBN-13: 978-0470013595
2. Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction (CWC), http://www.opcw.org/chemical-weapons-convention/

Recommended readings:

1. Richardt, Andre (2013), CBRN Protection: Managing the Threat of Chemical, Biological, Radioactive and Nuclear Weapons, Germany: Wiley-VCH Verlag & Co., ISBN 978-3-527-32413-2.
2. Stöhr, Ralf (Hrsg.)(1977): Chemische Kampfstoffe und Schutz vor chemischen Kampfstoffen, Berlin(-Ost), Militärverlag der DDR.

Responsible for course (name, position, scientific degree): Prof. László Földi, PhD

Other teachers (name, position, scientific degree): Prof. Em. László Halász, DSc

Title of the course: Radio-ecology	**Code:** HKDID4206A	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: Military Technology

Course description:
Radioecology is a scientific discipline which studies how radioactive substances interact with nature; how different mechanisms affect the substances' migration and uptake in food chain and ecosystems. Investigations in radioecology includes aspects of field sampling, designed field and laboratory experiments and the development of predictive simulation models.

Educational goal of subject - Competencies:
Giving a basics for detection and investigation of presence and environmental distribution of radioactive materials and their influence. Overviewing amount of nuclear emission and immission, the ways of control, and its effect on the population in case of different nuclear facilities. Giving general overview for Hungarian nuclear environmental protection underlining Paks NPP.

Required readings:

1. F. Ward Whicker, Ph.D.; Vincent Schultz, Ph.D.: Radioecology: Nuclear Energy and the Environment; Library of Congress Cataloging in Publication Data, 1982 by CRC Press, Inc., ISBN 0-8493-5353-X https://hwbdocuments.env.nm.gov/Los%20Alamos%20National%20Labs/TA%2021/10462.pdf

Recommended readings:

1. Outola, I. & al.:Characterization of the NIST seaweed Standard Reference Material, International Conference on Radionuclide Metrology and its Applications, 15. Applied radiation and isotopes, Vol.64, No. 10/11 (October-November 2006), 1242-1247
2. Koteles, G.J.: On the Radio-ecology of the Danube River, http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.565.2685&rep=rep1&type=pdf

Responsible for course (name, position, scientific degree): Dr. József Csurgai PhD

Other teachers (name, position, scientific degree):

Title of the course: Non-proliferation actions against the weapons of mass destruction	**Code:** HKDID4208A	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: Military Science, Military Technology

Course description:
History of nuclear, biological and chemical weapons till nowadays. Actual proliferation issues of CBRN weapons. Structure and operation of international non-proliferational agreements and organizations. Presentation of our domestic and international responsibilities and tasks. International inspection missions on the weapons of mass destruction.

Educational goal of subject - Competencies:
To give comprehensive knowledge on properties of weapons of mass destruction and their proliferation. Also a general overview on international agreements and organizations related to control of weapons of mass destruction, and the work of United Nations weapons inspectors.

Required readings:

1. Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction (CWC), http://www.opcw.org/chemical-weapons-convention
2. Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Signed at London, Moscow and Washington on 10 April 1972. Entered into force on 26 March 1975.

Recommended readings:

1. Richardt, Andre (2013), CBRN Protection: Managing the Threat of Chemical, Biological, Radioactive and Nuclear Weapons, Germany: Wiley-VCH Verlag & Co., ISBN 978-3-527-32413-2.
2. http://www.iaea.org
3. http://www.ctbto.org
4. http://www.unmovic.org

Responsible for course (name, position, scientific degree): Prof. László Földi, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Environmental management	**Code:** HKDID4210A	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
State and protection of the key elements of the environment and our natural resources. Principles of environmental management. Actions against economic and military threats to the environment, prevention, local, regional and global tasks and actions.

Educational goal of subject - Competencies:
To give comprehensive overview on the natural resources and the elements of the environment, their man-made damages and activities to protect them. Also knowledge on the task of environmental planning and environmental development.

Required readings:

1. Chris Barrow: Environmental Management for Sustainable Development, Routledge, 2006. ISBN-13: 978-0415365352
2. Gwendolyn Burke, Ben Ramnarine Singh, Louis Theodore: Handbook of Environmental Management and Technology, Wiley-Interscience; 2012. ISBN-13: 978-0471722373

Recommended readings:

1. Ecosystem Health: New Goals for Environmental Management; Edited by: Robert Costanza, Bryan G. Norton, Benjamin D. Haskell, Island Press, Washington, D.C. 1992; ISBN 1-55963-140-6

Responsible for course (name, position, scientific degree): Prof. László Földi, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Nature conservation	**Code:** HKDID4211A	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Relations between environmental protection and nature conservation. History of nature conservation. Structure of nature conservation organization in Hungary. Legal regulations on nature conservation. International nature conservation agreements and organizations. EU legizlations on nature conservation. Categories of nature conservation interest. Evaluation systems on nature conservation.

Educational goal of subject - Competencies:
To give detailed knowledge for practical applications of nature conservation information.

Required readings:

1. Peter Bromley: Nature Conservation in Europe: Policy and Practice, Taylor & Francis, 2012. ISBN 978-113-5158-5-90

Recommended readings:

1. Theo Colborn, Dianne Dumanoski and John Peter Meyers: Our Stolen Future; Published by Plume1997, ISBN-10: 0452274141, ISBN-13: 978-0452274143

Responsible for course (name, position, scientific degree): Prof. László Földi, PhD

Other teachers (name, position, scientific degree):

Title of the course: Technologies of monitoring and extermination of weapons of mass destruction	**Code:** HKDID4215A	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: Military Science, Military Technology

Course description:
Governmental responsibilities from international non-proliferation and arms control agreements of nuclear, biological and chemical weapons. International inspection tasks of surveillance, monitoring and destruction of CBRN weapons stockpiles. Lessons learned from international inspection missions on the weapons of mass destruction.

Educational goal of subject - Competencies:
To give basic knowledge on the technical issues of destruction of arms and stockpiles of weapons of mass destruction, and also on the application and future development of destruction technologies.

Required readings:

1. Richardt, Andre (2013), CBRN Protection: Managing the Threat of Chemical, Biological, Radioactive and Nuclear Weapons, Germany: Wiley-VCH Verlag & Co., ISBN 978-3-527-32413-2.
2. Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction (CWC), http://www.opcw.org/chemical-weapons-convention/
3. Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Signed at London, Moscow and Washington on 10 April 1972. Entered into force on 26 March 1975.

Recommended readings:

1. http://www.iaea.org
2. http://www.ctbto.org
3. http://www.unmovic.org

Responsible for course (name, position, scientific degree): Prof. László Földi, PhD

Other teachers (name, position, scientific degree): Dr. József Csurgai, PhD

Title of the course: NBC threat analysis of the territory of Hungary	**Code:** HKDID4216A	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: Military Technology

Course description:
Investigating potential sources of NBC (CBRN) threats in way of analising chemical and biological industrial objects and nuclear facilities. Comparative analysis of Hungarian and other NPPs. Radioactive waste management. Chemical facilities, transport of chemicals. Investigation meteorological particularities of Hungary for analysis of spreading NBC contamination.

Educational goal of subject - Competencies:
To give a general overview for investigating potential sources of HAZARD situations in Hungary.

Required readings:

1. ATP-45(D) WARNING AND REPORTING AND HAZARD PREDICTION OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR INCIDENTS (OPERATORS MANUAL)
2. AEP-45(C) WARNING AND REPORTING AND HAZARD PREDICTION OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR INCIDENTS (REFERENCE MANUAL)

Recommended readings:

1. Conklin, W Craig; Liotta, Philip L.: RADIOLOGICAL THREAT ASSESSMENT AND THE FEDERAL RESPONSE PLAN—A GAP ANALYSIS; Health Physics: November 2005 - Volume 89 - Issue 5 - p 457-470, doi: 10.1097/01.HP.0000178546.37526.c8
2. Radim Vičar, Dušan VIČAR: CBRN TERRORISM: A CONTRIBUTION TO THE ANALYSIS OF RISKS; Journal of Defense Resources Management (JoDRM), 2/2011, pp. 21-28.

Responsible for course (name, position, scientific degree): Dr. József Csurgai PhD

Other teachers (name, position, scientific degree):

Title of the course: Mathematical methods of risk analysis	**Code:** HKDID4221A	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: Military Technology

Course description:
Basics of the Probability theory and Mathematical statistics. Technical systems fault tree, HAZOP, and event tree analysis. Basics of the fuzzy logic.

Educational goal of subject - Competencies:
To give a general overview about methods of the operational risk assesment, as well as make a basic knowledge of risk analysis and its mathematical modelling.

Required readings:

1. Olav Kallenberg; Foundations of Modern Probability, 2nd ed. Springer Series in Statistics. (2002). 650 pp. ISBN 0-387-95313-2
2. Gut, Allan (2005). Probability: A Graduate Course. Springer-Verlag. ISBN 0-387-22833-0

Recommended readings:

1. http://en.wikipedia.org/wiki/Fuzzy_logic
2. http://en.wikipedia.org/wiki/Fault_tree_analysis

Responsible for course (name, position, scientific degree): Dr. József Csurgai PhD

Other teachers (name, position, scientific degree):

Title of the course: Containerised wastewater treatment systems of military camps	**Code: HKDID4238A**	**Credits: 3**
Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): lecture 30 hrs / 10 hrs		
Knowledge assessment (exam/academic grade): exam		
The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)		
Pre-subject requirements *(if any)*: -		
Course description: Basics of wastewater treatment: pre-treatment, biological processes, chemical processes. Activated sludge and attached growth technologies. Membrane techniques. Containerised wastewater treatment, decentralized solutions. Small size treatment unit selection and operation. **Educational goal of subject - Competencies:** Ability of selection and operation of containerized treatment systems based on the basics of wastewater treatment		
Required readings: Metcalf & Eddy: Wastewater Engineering Treatment and Reuse McGraw-Hill, 2013 ISBN: 978-1259010798 **Recommended readings:** Grady et al: Biological Wastewater Treatment, IWA Publishing, 2018. ISBN: 978-1138582828		
Responsible for course (name, position, scientific degree): Tamas KARCHES, associate professor, PhD		
Other teachers (name, position, scientific degree):		

Title of the course: Organic micropollutants and environmental safety	**Code: HKDID4242A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): 30 / 10 lectures

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: *none*

Course description:
Classification of organic micropollutants (OMPs), legal regulations. Occurrence, transport and fate of environmental pollutants in the environment. Environmental and health effects. General introduction to and main characteristics and effects of the major groups of OMPs. Analytical methods of detection. Preventing OMP discharge into the environment. Case studies.

Educational goal of subject - Competencies:
Students will be able to understand the potential consequences of OMPs on environmental safety. Students will get to know the various OMP groups as well as their adverse ecotoxicological and health effect. They will gain insight into the analytical methods to detect OMPs and methods for removal.

Required readings:
Calvo-Flores F.G., Isac-Garcia J., Dobado J.A: *Emerging Pollutants Origin, Structure and Properties*, 2018, Wiley-VCH
Knisz Judit: *Szerves mikroszennyezők a vizekben*, 2020

Recommended readings:
Wilkinson, J., et al., *Occurrence, fate and transformation of emerging contaminants in water: An overarching review of the field.* Environ Pollut, 2017. **231**(Pt 1): p. 954-970
Dinka, D.D., *Environmental Xenobiotics and Their Adverse Health Impacts-A General Review.* Journal of Environment Pollution and Human Health, 2018. **6**(3): p. 77-88.

Responsible for course (name, position, scientific degree): Judit Knisz, senior research scientist, PhD

Other teachers (name, position, scientific degree):

Title of the course: Soil conservation	**Code:** HKDID4243A	**Credits:** 3

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 20/6 hours / Seminar: 6/2 hours / Consultation: 4/2

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2nd - 4th. semester (depending on the individual educational program)

Pre-subject requirements *(if any)*: -

Course description:
The definition of soil and the characterisation of the main soil types in Hungary. Basics of soil conservation. Soil degradation processes: overview of water and wind erosion, structural degradation, natural and anthropogenic aciditation and the options for prevention. Characterisation of pollutants by source, damaged area and chemical composition. Effect of different pollutants on the biological activity of soil. Description of possible physical, chemical and biological remediation systems.

Educational goal of subject - Competencies:

The introduction of the main questions of soil conservation, furthermore, the possibilities of soil degradation prevention to the students. The effect of pollutants of different origins on the soil with special regard to the biological activity of the soil. After having completed the course successfully the students will be able to manage and solve soil conservation tasks and problems individually.

Required readings:
Duarte, A – Cachada, A - Rocha-Santos, T. (2017): Soil Pollution From Monitoring to Remediation ISBN: 9780128498736, Academic Press 312. p.

Recommended readings:
Helmut M (2013): Soil Remediation and Rehabilitation Treatment of Contaminated and Disturbed Land, ISBN 978-94-007-9822-9, Springer Netherlands, 408. p.
R. P. C. Morgan (2005):Soil Erosion And Conservation. ISBN 1-4051-1781-8, Blackwell Publishing, 304. p.
Miller M. E. – Bowker M. A. – Reynolds L. R. – Goldstein H. L. (2012): Post-Fire land treatments and wind erosion – Lessons from the Milford Flat Fire, UT, USA, Aeolian Research 7. pp. 29-44.
https://www.intechopen.com/books/soil-contamination/biological-remediation-of-hydrocarbon-and-heavy-metals-contaminated-soil

Responsible for course (name, position, scientific degree): Dr. Beke, Dóra, associate professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Hydrobiology	**Code: HKDID4244A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): 1 lecture/week/semester

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: -

Course description:

During the course students will get acquainted with the basic hydrobiological terminology, methods, aquatic habitats, we will deal with the light climate of the waters, aquatic material cycling, the most important aquatic associations of aquatic organisms (aquatic regions: lithoral, pelagial etc., planktonic and benthic associations, organisms of the water bottom, aquatic vegetation). We review the four elements of biological water qualification (halobity, trophity, saprobity, toxicity) as well as the ecological status assessment required by the EU Water Framework Directive and the most important water types of Hungary.

Educational goal of subject - Competencies:

With this knowledge, they will be able to assess the importance of environmental disasters affecting surface waters to the aquatic ecosystem, to learn about the most important aquatic habitats and water types in Hungary, and can help to the policy makes good decisions to protect the aquatic environment. With their knowledge, they can help exchange information and experiences between water engineers and ecologists in order to prevent disasters or to make managements and interventions to reduce potential damage more effective.

Required readings: Robert Wetzel (2001): Limnology. Academic Press pp. 1006, ISBN: 9780127447605, eBook ISBN: 9780080574394

Recommended readings: Keddy P.A. (2010): Wetland Ecology Principles and Conservation, Cambridge University Press

Allan J.D. Castillo M.M., (2011) Stream Ecology: Structure and function of running waters, Springer Netherlands,

Responsible for course (name, position, scientific degree): Dr. Éva Ács, Associate Professor, DSc

Other teachers (name, position, scientific degree):

Title of the course: Air purity protection	**Code:** HKDID4401A	**Credits:** 2

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 14/4 hours / Seminar: 4/1 hours / Consultation: 2/1

Knowledge assessment (exam/academic grade): academic grade

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Overview of air contamination sources and chemicals. Steps of pollution spreading (emission, transmission, immission). Effects of air pollution, human impacts. Possibilities of reduction of air pollution.

Educational goal of subject - Competencies:
To give overview on the air pollution processes, and also knowledge on the proper evaluation, the assesment of air pollution consequences of different industrial and other activities.

Required readings:

1. Ronald E. Hester, Roy M. Harrison: Air Quality Management, Royal Society of Chemistry, 1997. ISBN 978-085-4042-3-57.
2. Donald W. Moffat: Handbook of Indoor Air Quality Management, Prentice Hall, 1997. ISBN 978-013-2353-0-07.

Recommended readings:

1. Arnold W. Jr. Reitze, "Air Quality Protection Using State Implementation Plans - Thirty-Seven Years of Increasing Complexity," Villanova Environmental Law Journal 15, no. 2 (2004): 209-366
2. Air quality guidelines: Global update 2005, World Health Organization, UNAIDS – 2006. p. 485, ISBN 92 890 21926

Responsible for course (name, position, scientific degree): Prof. László Földi, PhD

Other teachers (name, position, scientific degree):

Title of the course: Waste handling and waste management	**Code:** HKDID4405A	**Credits:** 2

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 14/4 hours / Seminar: 4/1 hours / Consultation: 2/1

Knowledge assessment (exam/academic grade): academic grade

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Definition and categories of wastes. Possibilities of waste reduction. Principles of waste utilization. Industrial and communal wastes. Hazardous wastes. Waste disposal technologies. Collection and recycling of selected wastes. Incineration and deposition of hazardous wastes.

Educational goal of subject - Competencies:
To give overview on the different types of wastes and the ways of their proper handling, Also bring knowledge on the up-to-date waste management, 3-R (reduce, reuse, recycle). Give competency for problem solving of institutional and workplace waste management.

Required readings:

1. Jacqueline Vaughn: Waste Management: A Reference Handbook, ABC-CLIO, 2009. ISBN 978-159-8841-5-03
2. Act CLXXXV./2012. on waste management (26th November 2012.)

Recommended readings:

1. A.J. Morrisseya, J. Browneb: Waste management models and their application to sustainable waste management, https://ac.els-cdn.com/S0956053X03001818/1-s2.0-S0956053X03001818-main.pdf?_tid=c6951d0b-f7d1-4bda-8b01-469c1aaa7416&acdnat=1526465693_83b28816062ea98eab8bad5df793e11c
2. L. Giusti: A review of waste management practices and their impact on human health, https://ac.els-cdn.com/S0956053X09001275/1-s2.0-S0956053X09001275-main.pdf?_tid=72183dfc-bd8b-40c0-8385-1526349d274d&acdnat=1526465778_8137a18209c78bfeee64294abe8bea18

Responsible for course (name, position, scientific degree): Prof. dr. László Földi, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Turbulent diffusion of air pollutants	**Code:** HKDID4406A	**Credits:** 2

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 16/4 hours / Seminar: 2/1 hours / Consultation: 2/1

Knowledge assessment (exam/academic grade): academic grade

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: Military Technology

Course description:

1. Emission source term models
2. Atmospheric dispersion models
    a. Gaussian dispersion model
    b. Lagrangian dispersion model
    c. Eulerian dispersions model
    d. Dense gas model
3. Release and spread of Toxic Industrial Materials (TIM) during accidents
4. Meteorological conditions for spreading. Air stability, atmospheric models, using meteodata for prediction of spread.
5. Prediction procedures and monitoring systems for spreading air pollutants
6. Using softwares for atmospheric dispersion modelling

Educational goal of subject - Competencies:

To give a general overview about emission, transmission and immission of air pollutants paying attention to heavy gases, toxic and radioactive materials.

Recommended readings:

1. Földi László, Halász László: Környezetbiztonság, Complex Kiadó, 2009 Budapest, p 419, ISBN: 978-963-295-020-4
2. Dr. Halász László, Dr. Földi László: Környezetvédelem II, ZMNE Elektronikus egyetemi jegyzet, Budapest, 2008.
3. József Csurgai, János Zelenák, Árpád Vincze, József Solymosi, István Goricsán, László Halász, Tamás Lajos, István Pintér: Numerical simulation of transmission of NBC materials (Military technology, 2005/1. pp. 13-19)
4. József Csurgai, János Zelenák, Tamás Lajos, István Goricsán, László Halász, Árpád Vincze, József Solymosi: Numerical simulation of transmission of NBC materials, Academic and Applied Research in Military Science, Vol 5 (2006), Issue 3, pp. 414-437
5. József Csurgai: Analysis of relationship of nuclear disaster relief and chemical catastrophes (PhD dissertation, 2003)
6. János Zelenák: Further development of estimating procedures of the chemical and radiological situation analysis (PhD dissertation, 2010)

Responsible for course (name, position, scientific degree): Prof. Dr. László Halász DSc

Other teachers (name, position, scientific degree): Dr. József Csurgai PhD

Title of the course: Evaluation of NBC and fire situations	**Code:** HKDID4421A	**Credits:** 2

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 16/4 hours / Seminar: 2/1 hours / Consultation: 2/1

Knowledge assessment (exam/academic grade): academic grade

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: Military Technology

Course description:
Warning and reporting and hazard prediction of chemical, biological, radiological and nuclear incidents. Physical and chemical foundations of emission, transmission and immission of the toxic chemicals and radioactive materials. Consequences of serious incidents, accidents (Tokyo Sarin Attack, Chernobyl, Tokai Mura, Enschede, AZF Toluouse, Fukusima). Functional structure and operational principals of the CBRN Warning and Reporting System and Hungarian disaster relief system.

Educational goal of subject - Competencies:
To give a general overview for implementation and investigation of the procedures of the CBRN Warning and Reporting System.

Recommended readings:

1. ATP-45(D) WARNING AND REPORTING AND HAZARD PREDICTION OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR INCIDENTS (OPERATORS MANUAL)
2. AEP-45(C) WARNING AND REPORTING AND HAZARD PREDICTION OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR INCIDENTS (REFERENCE MANUAL)

Responsible for course (name, position, scientific degree): Dr. József Csurgai PhD

Other teachers (name, position, scientific degree):

Title of the course: Climate change, climate extremes	**Code: HKDID4439A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture - **/ Seminar: 20/6 hours** / Consultation: -

Knowledge assessment (exam/academic grade): academic grade

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*:

Course description:

Weather and climate, global warming, climate change. Basics of the statistical climatology, distributions of the meteorological parameters, statistics of extremes. Observed and projected tendencies, averages and extremes in Hungary based on measured data and regional climate model predictions. Effects of climate extremes to military activities.

Educational goal of subject - Competencies:

To give a general overview for climate, global warming, climate change and statistics of extremes. To introduce climatic data analysis by statistical methods, to give knowledge about statistical features (averages and extremes, return levels and periods, extreme value thresholds, indices). With a changing climate which issues in change of the distribution of meteorological parameters, might also change frequencies and intensity of extremes. This knowledge can help to adapt to effects of climate change and mitigate vulnerability of different military activities.

A **3-5** legfontosabb *kötelező,* illetve *ajánlott* **irodalom** (jegyzet, tankönyv) felsorolása bibliográfiai adatokkal (szerző, cím, kiadás adatai, oldalak, ISBN)

Required readings:

1. IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.
2. IPCC, 2012: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, UK, and New York, NY, USA, 582 pp.

Recommended readings:

3. Amir AghaKouchak et al. (szerk), 2013: Extremes in a Changing Climate. Detection, Analysis and Uncertainty. Water Science and Technology Library,

Vol. 65, Springer Dordrecht Heidelberg New York London, 423 pp., ISBN 978-94-007-4478-3, ISBN 978-94-007-4479-0 (eBook)
4. László Földes, József Padányi (ed.), 2014: Effects of climate change to military activities. National University of Public Service. 270 pp. ISBN 9786155305252
5. Mónika Lakatos et al., 2020: Return values of 60-minute extreme rainfall for Hungary. IDŐJÁRÁS Quarterly Journal of the Hungarian Meteorological Service, Vol. 124, No. 2, April – June, 2020, pp. 143–156 (https://met.hu/ismeret-tar/kiadvanyok/idojaras/)
6. Csilla Péliné Németh et al., 2016: Analysis of climate change influences on the wind characteristics in Hungary. IDŐJÁRÁS Quarterly Journal of the Hungarian Meteorological Service Vol. 120, No. 1, January – March, 2016, pp. 53–71

Responsible for course (name, position, scientific degree): Csilla Péliné dr. Németh, PhD.

Other teachers (name, position, scientific degree)

Title of the course: Modeling and Optimization of Logistics Networks	**Code: HKDID5219A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): lecture, 30/10

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Basic definitions in graph theory: node, edge, loop, multiple edges, degree, walk, trail, path, tour (Bridges of Königsberg), clique, directing, weighting, connected graph, component, tree, leaf, root, forest, (minimum) spanning tree, complete graph, complement graph, isomorphism, dual graph. Applications in logistics.
Shortest path algoritms. Applications on minimizing path length, time and cost. Limitations of greedy algorithms.
Flow. Max-flow min-cut theorem. Capacity and rerouting. Application on the travelling salesman problem and the assignment problem.
Cluster analysis. Hierarchical (agglomerative and divisive) and non-hierarchical (centroid-based and density-based) clustering. Spreading phenomena. The butterfly effect. Cascades. Chaos.
Random networks, robustness, scale-free networks. Degree-correlation. Random failure and targeted attack. Vulnerability and resilience. Application on critical infrastructure. Entanglement.
Problems of modeling: accuracy (data, results), conditions, approximations, simplifications, second-order approximation, interpreting the results, decomposing and simplifying the results, solvability.

Educational goal of subject - Competencies:
The student knows to use graph theory to describe and model networks with different structure, with special attention to critical infrastructures. They are able to recognize the imortant network elements and to identify them using mathematical and computational methods. They know and handle the inaccuracies of models originating in approximations and simplifications and their effect on the results of the model used.

Required readings:
Albert-László Barabási: Network Science. http://networksciencebook.com/

Recommended readings:
Wayne L. Winston: Operations Research Applications and Algorithms, Brooks/Cole Thomson Learning, Belmont, CA, USA, 2003. ISBN 9780534380588
Erik Jenelius: Redundancy importance: Links as rerouting alternatives during road network disruptions, *Procedia Engineering* 3, pp. 129-137 (2010), DOI: 10.1016/j.proeng.2010.07.013

Responsible for course (name, position, scientific degree): Dr. Bence TÓTH, habil. senior lecturer, PhD

Other teachers (name, position, scientific degree):

Title of the course: Numerical Solution of Logistics Problems	**Code: HKDID5220A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): lecture, 30/10

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
The knapsack problem and its applications. Modeling bottlenecks.
The change-making problem. The limitations of greedy algorithms.
The facility location problem. Simultaneous minimization and maximization of various parameters.
Scheduling. Single machine and job shop scheduling.
Hyperbolic programming problems. Sensitivity analysis.
Forecasting models. Moving-average, exponential smoothing, seasonality, regression.
Approximation methods: least squares. Random numbers, Monte Carlo simulation.
Queuing. Probability distributions, memoryless property. Single, finite number and infinite number of servers. Arrival processes and service times of Markovian, degenerate and general distributions.
Problems of modeling: accuracy (data, results), conditions, approximations, simplifications, second-order approximation, interpreting the results, decomposing and simplifying the results, solvability.

Educational goal of subject - Competencies:
The student knows some simple operations research problems, their solution methods and their applications in military logistics. They are able to recognize the important elements in the problems and to apply proper mathematical and computational methods in solving them. They know and handle the inaccuracies of models originating in approximations and simplifications and their effect on the results of the model used.

Required readings:
Albert-László Barabási: Network Science. http://networksciencebook.com/

Recommended readings:
Wayne L. Winston: Operations Research Applications and Algorithms, Brooks/Cole Thomson Learning, Belmont, CA, USA, 2003. ISBN 9780534380588
Erik Jenelius: Redundancy importance: Links as rerouting alternatives during road network disruptions, *Procedia Engineering* 3, pp. 129-137 (2010), DOI: 10.1016/j.proeng.2010.07.013

Responsible for course (name, position, scientific degree): Dr. Bence TÓTH, habil. senior lecturer, PhD

Other teachers (name, position, scientific degree):

Course's name: Case Studies in Logistics	**Code: HKDID 5224A**	**Credits: 3**

Type of the course[5]: **lecture** / seminar / class work / consultation and the number: **lecture: 2 h …….Seminar:** ….. h

Method of evaluation (**colloquium** / seminar grade / other[6]): colloquium

Course's place in the curriculum (which semester): 3.

Preliminary course conditions *(if exists)*: **no**

Course description: acquiring the knowledge and competences to be developed in a short, informational way: Examining and processing case studies connected to logistics and supply chain management provide a good opportunity to the understanding of logistical processes and operational mechanisms of supply chain by combining literature and practice. Processing case studies can take place by inviting professionals who share their experiences, or by solving cases.

Fields of study:

1. Methods of solving case studies.

2-3. Processing case studies. (Logistics in economy)

4-5. Processing case studies. (Inventory - storage)

6-7. Processing case studies. (Materials management)

8-9. Processing case studies. (Material handling, transportation)

10-11. Processing case studies. (Supply chains, cooperation)

12-13. Processing case studies. (Uncertainties in the supply chains)

14-15. Conclusion of knowledge and experiences.

Competences: Aim is to develop thinking at systematical level. Acquiring routine in identifying logistical and professional problems and in working out solutions and ideas.

The **3-5** most important *compulsory* literature, and *advised* literature (author, address, data of publication, pages, ISBN)

Compulsory literature:

- Horváth Attila: Az ellátási lánc, mint kritikus infrastruktúra (létfontosságú rendszerelem). In: Csengeri, János; Krajnc, Zoltán (szerk.) Humánvédelem - békeműveleti és veszélyhelyzet-kezelési eljárások fejlesztése Budapest, Magyarország : Nemzeti Közszolgálati Egyetem, Hadtudományi és Honvédtisztképző Kar, (2016) pp. 550-614. URL cím: http://real.mtak.hu/33554/1/tanulmanygyujtemeny%20_ujratervezes_CsJ_KZ_1.5.pdf
- Hegedűs Ernő – Turcsányi Károly: Vasúti szállítás kontra tengeri szállítás: a Madrid Jivu vasútvonal logisztikai és biztonságpolitikai szerepe: - szállítási ágak, közlekedés stratégia vizsgálata, Katonai Logisztika 2018:3-4 pp. 241-272.
- Keszthelyi Gyula: Ellátási lánc menedzsment és logisztika kapcsolatrendszere, élettartam,-költségmenedzsment, Katonai logisztika, 2018:1, pp.42-71.
- Szegedi Zoltán: Logisztika - menedzsment esettanulmányok, Kossuth Kiadó, Budapest, 2008

Advised literature:

- Szegedi Zoltán: Case Studies to Logistics Management, Kossuth Kiadó, Budapest, 2008 (angol nyelvű esettanulmányok)

[5] **Ftv. 147. §** *tanóra:* a tantervben meghatározott tanulmányi követelmények teljesítéséhez oktató személyes közreműködését igénylő foglalkozás (előadás, szeminárium, gyakorlat, konzultáció)

[6] pl. évközi beszámoló

- Padányi József: The Significance of Civil-military Cooperation in Missions and Preparation in Crisis Aerials. in Újházi Lóránd; Kaló József; Petruska Ferenc (szerk) Budapest Report On Christian Persecution, 2019. Budapest Háttér Kiadó, pp. 15-24.

Notes:

Responsible tutor: (*Pató Gáborné Szűcs Beáta, associate professor, Ph.D., habil*.**)**

Tutors involved in the course, if there exist (*name, status, academic degree)*

Note: max. 1 page

Title of the course: Supply Chain Designing and Security	**Code:HKDID5407A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **20/6**

Knowledge assessment (exam/academic grade): **academic grade**

Knowledge assessment (exam/academic grade): 2-4.

Pre-subject requirements *(if any)*: none

Subject Objectives:

Subject develops student´s ability to identify, describe and analyse the design and operation of the supply chains and logistics workflow of under the conditions of uncertainty. There are identified the ties and dependence of multinational military logistics on the capabilities of civil entities and critical logistics infrastructure, especially from the point of view of supply chain security and long-term sustainability. The international and national points of views are discussed Subject enhance the supply chain theory and methodology of projecting and management of logistics processes, together with the security and sustainability aspects. For successful fulfilment subject´s task is appropriate prerequisites of understanding of the principles of military and civilian logistics, knowledge of project management and stochastic approaches is advantage. In the beginning of the subject, there is initial session with lecturer and discussion on the current influencing factors directly or indirectly influencing the military logistics chains, under the conditions of uncertainty. Then follows the main part of subject which is preparation of analytical study focused on selected part of supply chain with evaluation of influencing factors and preparation recommendation for enhancing the supply chain design and overall long-term sustainability.

Subject Completion:

The main part of the subject is laid on the preparation of the study in the length up to 20 pages. The subjects end with the evaluation and following expert discussion based on the study and its results.

Required readings:

1. KOTZAB, H.; SEURING, S.; MÜLLER, M.; REINER, G. *Research Methodologies in Supply Chain Management.* New York: Physical-Verlag Heilderberg, 2005. ISBN 3-7908-1583-7. 619 pp.
2. WATERS, D. *Supply Chain Risk Management – Vulnerability and Resilience in Logistics*. London: Kogan Page Limited, 2007. ISBN 978-0-7494-4854-7. 256 pp.
3. FELLMAN, P.; BAR-YAM, Y.; MINAI, A. *Conflicts and Complexity – Countering Terrorism, Insurgency, Ethnic and Regional Violence.* New York: Springer Science+Business Media, 2015. ISBN 978-1-4939-1705-1. 292 pp.
4. TANG, C.; TEO, C-P.; WEI, K-K. *Supply Chain Analysis – Handbook on the Interaction of Information, System and Optimization.* New York: Springer Science+Business Media, 2008. ISBN 978-0-387-75239-6. 284 pp.

Recommended readings:

1. SIMCHI-LEVI, D.; WU, D.; SHEN, Z. *Handbook of Quantitative Supply Chain Analysis – Modelling in the E-Business Era.* New York: Springer Science+Business Media, 2004. ISBN 1-4020-7953-2.
2. ROBINSON, Stewrt. *Simulation*. Chichester: John Wiley, 2004, 339 s. ISBN 0-470-84772-7.

Responsible for course:

Col (GS) Dr. habil. Ing. Pavel Foltin, Ph.D.; University teacher/Head of Department of Logistics, Faculty of Military Leadership, University of Defence

Other teachers: -

Title of the course: Network Analysis of Critical Infrastructures	**Code: HKDID5412A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): seminar, 20/6

Knowledge assessment (exam/academic grade): academic grade

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Basic definitions in graph theory.
Graph-theory based modeling of critical infrastructures. Weigting and directing.
Quantitative analysis and comparison of networks both on the global and local range. Opportunities and limitations of shortest path finding algorithms. Centrality measures.
Determining capacity: flow and cut.
Redundancy measures. Identifying redundant elements of a network. Handling 1-edge-connected and 1-vertex-connected networks. Connection between traffic and redundancy. Inclusion and evaluation of redundancy in the view of the security of the network.
Robustness of networks. Identifying random, small world and scale-free networks based on their behaviour in the case of random failure and targeted attack.
Problems of modeling: accuracy (data, results), conditions, approximations, simplifications, second-order approximation, interpreting the results, decomposing and simplifying the results, solvability.

Educational goal of subject - Competencies:
The student knows the basic definitions of graph theory and its various applications in describing critical infrastructures with different types and strucures, as networks. They are able to apply measures used in describing networks in identifying critical network elements. They know the methods of identifying redundant network elements and their difficulties and can apply them in describing the safety of networks. They are able to forecast anomalies of critical infrastructures appearing in the case of disruption by the analysis of the robustness of the network. They know and handle the inaccuracies of models originating in approximations and simplifications and their effect on the results of the model used.

Required readings:
Albert-László Barabási: Network Science. http://networksciencebook.com/

Recommended readings:
Wayne L. Winston: Operations Research Applications and Algorithms, Brooks/Cole Thomson Learning, Belmont, CA, USA, 2003. ISBN 9780534380588
Erik Jenelius: Redundancy importance: Links as rerouting alternatives during road network disruptions, *Procedia Engineering* 3, pp. 129-137 (2010), DOI: 10.1016/j.proeng.2010.07.013

Responsible for course (name, position, scientific degree): Dr. Bence TÓTH, habil. senior lecturer, PhD

Other teachers (name, position, scientific degree):

Title of the course: Applied statistics	**Code: HKDID6212A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 30 h./10 h.

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester

Pre-subject requirements *(if any)*: none

Course description:

This course aim is that students acqiure an active knowledge of the basics of probability theory and get skills in its application to the methods in applied statistics. The topics are: Probability theory basics: Postulates of probability theory. Expected values and their properties. The law of large numbers. Probability distributions: i.e. binomial, Poisson distribution, exponential and normal distribution. The Poisson process. Chi-squared, Student distributions. Sampling methods. Statistical analysis. Estimation methods: maximum likelihood, least squares. Properties of estimators. Confidence intervals. Hypothesis testing.

Educational goal of subject - Competencies:

To give a general overview about the concepts of applied statistics, as well as its mathematical background.

Required readings:

1. W. H. Press et al.: Numerical Recipes, The Art of Scientific Computing, Cambridge University Press, 1986 C.
2. J. R. Green, D. Margerison: Statistical Treatment of Experimental Data, Elsevier, 1978
3. Reimann, Tóth: Valószínűségszámítás és matematikai statisztika, Budapest, 2004.

Recommended readings:

1. William Feller: An Introduction to Probability Theory and its Application, John Wiley, 1971
2. Bolla Marianna, Krámli András: Statisztikai következtetések elmélete, Typotex Kiadó, Budapest, 2005.
3. Rényi: Valószínűségszámítás. Tankönyvkiadó. Budapest, 1968.
4. Chatfield, A. J. Collins: Introduction to Multivariate Analysis, Chapman and Hall, 1980

Responsible for course (name, position, scientific degree): Dr. István Horváth, professor, DSc

Other teachers (name, position, scientific degree): –

Title of the course: Management of Industrial safety	**Code: HKDID7109A**	**Credits: 6**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): 60/20 hours

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4.

Pre-subject requirements *(if any)*: none

Course description:

1. The basics of the management of industrial safety. Prevention of man-made disasters. Definitions and criteria.
2. Fields, organisation and system of procedures of industrial safety.
3. Tasks of the operator, authority and local government related to industrial safety; system of measures of prevention and preparation.
4. Applying and reviewing systems (standards) for work health and safety and environmental management.
5. International, EU and national legislation related to the protection against major accidents involving dangerous materials.
6. Industrial safety tasks of legislation related to critical infrastructure.
7. Prevention of nuclear accidents and related industrial safety tasks.

Education goal of subject - Competences:

Students become acquainted with the general and specific strategic and tactical principles, legal regulation, organisation of industrial safety management as well as its procedures and equipment for preparation and prevention of industrial disasters and accidents.

Required readings:

1. Fairman; Mead; Williems: Environmental Risk Assessment. Monitoring and Assessment Research Centre, King's College London; ISBN 92-9167-080-4
2. Kátai-Urbán Lajos: Handbook for the Implementation of the Basic Tasks of the Hungarian Regulation on „Industrial Safety" Budapest: Nemzeti Közszolgálati Egyetem, 2014. 73 p. (ISBN 978-615-5491-70-2)
3. Kátai-Urbán L.: Establisment and Operation of the System for Industrial Safety within the Hungarian Disaster Management. ECOTERRA: JOURNAL OF ENVIRONMENTAL RESEARCH AND PROTECTION (ISSN: 1584-7071) 11: (2) pp. 27-45. (2014)
4. Lajos Kátai-Urbán; József Solymosi: Overview of consequence modelling in process industry, ACADEMIC AND APPLIED RESEARCH IN MILITARY SCIENCE (ISSN: 1588-8789) 3: pp. 407-416. (2006)

Recommended readings:

1. Kátai-Urbán, Lajos; Vass, Gyula; Sibalinné Fekete Katalin: Establishment and Implementation of Hungarian System for Critical Infrastructure Protection. pp. 353-360. (2014) In.: 19. medzinárodná vedecká konferencia Riešenie krízových situácií v špecifickom prostredí. Konferencia helye, ideje: Zilina, Szlovákia: 2014.05.21-2014.05.22. (ISBN 978-80-554-0872-9) A konferencia szervezője: Fakulta špeciálneho inžinierstva ŽU

2. Kátai-Urbán Lajos, Révai Róbert: Possible Effects of Disasters Involving Dangerous Substances Harmful to the Environment, Human Life and Health: A veszélyes anyagokkal kapcsolatos katasztrófák lehetséges környezetet, emberi életet és egészséget károsító hatásai. BOLYAI SZEMLE XXII.:(2) pp. 151-158. (2013)
3. Horváth Hermina, Kátai-Urbán Lajos: Assessment of the Implementation Practice of Emergency Planning Regulations Dedicated to the Rail Transportation of Dangerous Goods. ACADEMIC AND APPLIED RESEARCH IN MILITARY SCIENCE 12:(1) pp. 73-82. (2013)

Notes: -

Responsible for course:
COL. Dr. Gyula Vass PhD, associate professor

Other teachers:

COL. Dr. Lajos Kátai-Urbán PhD, associate professor

Title of the course: Disaster management	**Code:** HKDID7110A	**Credits: 6**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): Lecture 40/12 hours / Seminar: 12/4 hours / Consultation: 8/4 hours
60/20 hours

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester):
2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:
Fundamentals and tasks of fire prevention, civil protection and industrial safety, system of tools for disaster prevention
• Authority tasks, integrated authority activities
• Fire protection in the disaster management system, official activities
• Regulation of official and specialist tasks
• Prevention and official tasks and goals of civil protection
• Rules for the disaster protection classification of settlements and protection requirements (Risk identification, Risk analysis and assessment)
• Tasks of industrial safety
• Prevention of major accidents involving hazardous substances
• Critical infrastructure
• Transport of dangerous goods (ADR, RID, ADN, ICAO / IATA)
• Organizational and management system of disaster management (Parliament, Periods of the special legal order, Tasks of the Government, Minister responsible for disaster protection)
• The structure and tasks of the county and local defense committee
• Management levels and professional bodies of the professional disaster management bodies (National Directorate General for Disaster Management of the Ministry of the Interior, Definition and evaluation of the tasks of the professional disaster management bodies, The regional body, the county disaster management directorate, the local bodies, the
• Other key topics (Hungary's flood and inland water risk, Hungary's earthquake risk, The Monitoring and Public Alert System, The National Nuclear Accident Prevention System, Disaster Management Mobile Laboratories (KML), Disaster Management Radiation Detection Units (KSE)

Educational goal of subject - Competences:
The subject of Disaster Management is used for the interpretation and study of natural and artificial events (accidents) that have occurred in Hungary, and for the acquisition of the most important theoretical and practical knowledge of the activities required during the assessment and liquidation of disasters.
The general aim of teaching the subject is that doctoral students studying at the Doctoral School of Military Engineering, at a high professional level, gain knowledge of the field

of science and receive answers to their scientific questions, which can be used to supplement their research topics.

Required readings:

- Rick Bissell: Preparedness and response for catastrophic disasters, CRC PressTaylor & Francis Group, ISBN 978-1-4665-1191-0 (eBook - PDF), 2013

Recommended readings:

- Philip E. Hagan, John F. Montgomery, James T. O'Reilly: Accident prevention manual for business & industry engineering & technology, ISBN 0-87912-213-7, National Safety Council, 12th edition, Illinois, 2001
- Nicolas A. Valcik and Paul E. Tracy: Case studies in disaster response and emergency management, ISBN 978-1-4398-8317-4 (eBook - PDF), CRC PressTaylor & Francis Group, 2013
- Rick Bissell: Preparedness and response for catastrophic disasters, CRC PressTaylor & Francis Group, ISBN 978-1-4665-1191-0 (eBook - PDF), 2013
- Anthony D. Manley: Security Manager's Guide to Disasters Managing Through Emergencies, Violence, and Other Workplace Threats, CRC PressTaylor & Francis Group, ISBN 978-1-4398-0906-8 (Book), 2009

Responsible for course (name, position, scientific degree):
Col(Ret.) József SOLYMOSI, DSc, Professor Emeritus

Other teachers (name, position, scientific degree): Dr. habil. József DOBOR, associate professor

Title of the course: Civil protection	**Code: HKDID7111A**	**Credits: 6**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **60/20**

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4

Pre-subject requirements *(if any)*: none

Course description:

1. Civil protection regulations on the protection against disasters.
2. Coordination of the protection against disasters between the various sectors.
3. The national system of coordinated disaster response.
4. Disaster management mechanism assisting governance.
5. National, sectoral, regional and local tasks of civil protection.
6. Organisation of regional and local civil protection tasks. The interpretation of state of emergency in disaster management.
7. Government control over disaster management.
8. Ideas on the improvement of disaster management.

Competences:

Students get acquainted with and do research on the theoretical background of civil protection regulations on disaster management; on the coordination of the protection against disasters between the various sectors, with special regard to the Inter-ministerial Committee for the Coordination of Disaster Management (KKB).
Students gain deep knowledge and do research on the national system of coordinated disaster response; the disaster management mechanism assisting governance; the national, sectoral, regional and local tasks of civil protection; organisation of regional and local civil protection tasks; the interpretation of state of emergency in disaster management; government control over disaster management; ideas on the improvement of disaster management.

Required readings:

1. Endrődi István: The Place and Role of the Information System Civilhelp.hu in the Structure of Disaster Management and its Importance in the Execution of Civil Protection Tasks. In: NISPAcee (szerk.) Government vs. Governance in Central and Eastern Europe: From Pre-Weberianism to Neo-Weberianism? Presented Papers from the 22nd NISPAcee Annual Conference. Konferencia helye, ideje: Budapest, Magyarország, 2014.05.22-2014.05.24. Pozsony: NISPAcee, 2014. pp. 28-41.
2. Endrődi István, Teknős László: New possibilities of emergency communication and information in the protection phase of disaster management. *ACADEMIC AND APPLIED RESEARCH IN PUBLIC MANAGEMENT SCIENCE* 13**:**(2) *pp. 235-249.* (2014)
3. Endrődi István: European cooperation forum of civilian protection organizations. In: Robert Zupan, Ana Kuvezdic Divjak. 3 rd International Conference Crisis Management Days. Konferencia helye, ideje: Velika Gorica, Horvátország, 2010.05.27-2010.05.28. Velika Gorica: University of Applied Sciences, 2010. pp. 718-735.
   (ISBN:978-953-7716-07-3)

Recommended readings:

1. Insarag preparedness and response. INSARAG Guidelines. URL.: http://www.insarag.org/en/methodology/guidelines.html (Downloaded: 2015.05.15.

Notes: -

Responsible for course:
Dr. László Teknős assistant professor, PhD

Other teachers: **Ret. Col. István Endrődi, PhD**

Title of the course: Nuclear safety and events/accidents	**Code:** HKDID7112A	**Credits: 6**

Type of lessons (lecture/seminar/consultation) and learning hours (full time training/part time training): 60/20

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

1) Basic knowledge in radiochemistry and nuclear energetics
2) Types constraction and service of NPPs
3) Basic of nuclear safety in NPP
4) Evets and accidents in NPPs
5) Legal background of nuclear safety emergency preparedness
6) Technical, logistical, organizational background of emergency preparedness in NPP
7) Aspects of safety and nuclear preparedness in Paks NPP

Educational goal of subject - Competencies:

Basic knowledge in nuclear energetics and characteriscs of events and accidents. Students learn about safety rules and equipments. They will got knowledge about the methods of nuclear disaster preparedness. They will got detailed information about the safety and nuclear disaster preparedness in NPP Paks.

Required readings:

1. J. Shapiro, Radiation Protection, HARVARD UNIVERSITY PRESS Cambridge, Massachusetts, and London, England, www.ilea.ufrgs.br/radioisotopos/livroradio.pdf
2. DOE FUNDAMENTALS HANDBOOK, NUCLEAR PHYSICS AND REACTOR THEORY, Volume 1 and 2, JANUARY 1993 http://energy.gov/sites/prod/files/2013/06/f2/h1019v1.pdf http://www.steamtablesonline.com/pdf/Nuclear-Volume2.pdf

Recommended readings:

1. Pátzay, Gy ; Weiser, L ; Feil, F ; Patek, G: Analysis and Selective Treatment of Radioactive Waste Waters and Sludges in Waste Water: Chapter 9. In: Fernando, Sabastian Garcia - Fernando, Sabastian Garcia (szerk.) Waste Water- Evaluation and Management. Rijeka, Horvátország : InTech Education and Publishing, (2011) pp. 203-216. , 14 p.
2. Dávid, Havasi ; Ádám, Hajnal ; György, Pátzay ; László, T Mika. Vapor–Liquid Equilibrium of γ-Valerolactone and Formic Acid at JOURNAL OF CHEMICAL AND ENGINEERING DATA 62 : 3 pp. 1058-1062. , 5 p. (2017)

Responsible for course (name, position, scientific degree): Prof. Em. György Pátzay, professor emeritus, PhD

Other teachers (name, position, scientific degree): Dr. Kristóf HORVÁTH PhD

Title of the course: Fire protection	**Code: HKDID7113A**	**Credits: 6**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **60/20**

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

1. Concepts in fire protection within the unified disaster management administration.
2. The hierarchy of fire protection legislation, fields of regulation, rights and responsibilities.
3. The structure and operation of fire protection in Hungary.
4. Organising rescue operations, organising and performing fire interventions and technical rescue.
5. The tasks and competence of fire prevention, its structure and procedures.
6. Fire inspection and analysis of interventions.
7. The activities of Disaster Management Operations Unit.

Educational goal of subject - Competencies:

This course provides a comprehensive understanding of the concept of fire protection, its legislation, fields of regulation as well as the rights and responsibilities of participants in fire protection. Students develop an understanding about the rules of fire prevention and rescue operations, their tasks and competence, the system of organisations and instruments.

Students are introduced to fire inspection, analysis of interventions and the procedures, structure and instruments of Disaster Management Operations Unit.

Required readings:

1. Bodnár László, Restás Ágoston, Xu Qiang: Conceptual Approach of Measuring the Professional and Economic Effectiveness of Drone Applications Supporting Forest fire Management, PROCEDIA ENGINEERING 211: (2018) pp. 8-17.
2. Restás, Á.: An Approach for Measuring the Economical Efficiency of Aerial Fire Fighting Wildfire2011: The 5th International Wildland Fire Conference: Sun City, South Africa, 09-13.05.2011.
3. Restás Á.: A Model for Firefighting Managers Making Decisions in Emergencies Proceedings of the 11th Int'l Conf. on Naturalistic Decision Making Marseille, France, 21-24.05.2013.

Recommended readings:

1. Restás, Á.: Examples for Drone Applications Supporting Disaster Management, 10th ELSEDIMA conference, Cluj-Napoca, Romania, 2014.09.18-19.
2. Sonechkin, Vladimir ; Panasevich, Liudmila ; Bleszity, János: Условия взвихрения пыли в деревообрабатывающем помещении. POZHARY I CHREZVYCHAJNYE SITUACII: PREDOTVRASHENIE LIKVIDACIA 1 pp. 53-57. , 5 p. (2018)

Responsible for course (name, position, scientific degree): **Professor emeritus Dr. Bleszity János, CSc.**
Other teachers (name, position, scientific degree): **Dr. habil. Restás Ágoston associate professor, Eng. PhD, PhD**

Title of the course: Safety of Dangerous Activities	**HKDID7115A**	**Credits: 6**
Place of the course: HHK KMDI doctorial education		
Type of lessons and learning hours: 60/20		
Knowledge assessment: exam		
The course place in the curricula (in which semester): 2-4		
Pre-subject requirements *(if any)*: none		

Course description:

The aim of the subject is that the students get to know the authoritative tasks and responsibilities laid down in disaster management legislation concerning the dangerous activities, technical requirements related to the performance of the tasks of business organizations and a set of technical tools to support implementation.

Course description:

1. Fundamentals of safety for dangerous activities.
2. Disaster management features of dangerous activities.
3. Identification and classification of dangerous activities.
4. Operational and regulatory technical requirements and equipment system for dangerous establishments.
5. Operational and regulatory technical requirements and equipment system for dangerous goods activities.
6. A set of technical tools to ensure the security of critical infrastructures.
7. Technical requirements and system of equipment for fire prevention of dangerous installations.
8. Technical support to water and water authorities.
9. Technical equipment system for the protection of dangerous military objects.

Competences: High level theoretical knowledge of the safety of dangerous activities, carrying out independent activities in connection with the organization, management and scientific tasks related to the relevant scientific field.

Required readings:

5) Fairman; Mead; Williems: Environmental Risk Assessment. Monitoring and Assessment Research Centre, King's College London; ISBN 92-9167-080-4
6) Kátai-Urbán Lajos: Handbook for the Implementation of the Basic Tasks of the Hungarian Regulation on „Industrial Safety" Budapest: Nemzeti Közszolgálati Egyetem, 2014. 73 p. (ISBN 978-615-5491-70-2)
7) Kátai-Urbán L.: Establisment and Operation of the System for Industrial Safety within the Hungarian Disaster Management. ECOTERRA: JOURNAL OF ENVIRONMENTAL RESEARCH AND PROTECTION (ISSN: 1584-7071) 11: (2) pp. 27-45. (2014)

Recommended readings:

4) Lajos, Kátai-Urbán: Assessment of the Authority Experiences Related to the Supervision of Dangerous Goods Transportation. HADMÉRNÖK XI : 4 pp. 91-101. , 11 p. (2016)

5) Kátai-Urbán, Lajos ; Vass, Gyula: Safety of Hungarian Dangerous Establisments - Review of the Industrial Safety's Authority. HADMÉRNÖK IX. : 1 pp. 88-95. , 8 p. (2014)
6) Bleszity, János ; Kátai-Urbán, Lajos: Assessment of the Development of Legal Regulation on the Protection of Major Accidents. MAGYAR RENDÉSZET XVI : 2 pp. 43-54. , 12 p. (2016)

Responsible for course: COL. Dr. habil. Lajos Kátai-Urbán PhD, associate professor

Other teachers: COL. Dr. habil. Gyula Vass PhD, associate professor

Title of the course: Applied Firefighting HKDID7116A	**Credits: 6**

Type of lessons and learning hours: 60/20

Knowledge assessment: exam

The course place in the curricula (in which semester): 2-4

Pre-subject requirements *(if any)*: none

Course description:

The aim of the subject is that the students get to know the physical background of fire and fire elimination, the factors affecting the effectiveness of fire fighting in different types of fires, as well as the technical requirements and support of interventions.

Course description:

1. Physics of fire
2. Physics of fire elimination
3. Practice of fire suppression, tactics of firefighting
4. Applied firefighting in different cases
5. Effective fire management.

Competences:

Students gain comprehensive knowledge of the physical background of fire burning, the theoretical basis of extinguishing and its practical implementation, and the tactics of firefighting. Students will learn about the forms of effective firefighting in different cases, what conditions must be provided for them, and how firefighting is conducted and managed.

Requirements:

The prerequisite for signing the semester is that the student must report on the theoretical knowledge in a closed-class thesis. The signature also requires participation in a full-time course of at least 75% of the time, correspondence training of at least 50% of the hours, and at least a satisfactory evaluation of the closed-ended thesis. The students report on the subject knowledge in the final exam.

Required readings:

8) Restás, Á.: Physics of fire (English manuscript)
9) Restás, Á.: R-20F method: An Approach to measure the isolation effect of foam used fighting forest fires
10) Regulation of the operations, technical rescue and disaster response activities of disaster management. (6/2016. (IV.24.) BM OKF instruction, English version)
11) Dedicated articles of Védelem Tudomány and Katasztrófavédelem periodicals

Recommended readings:

7) Restás, Á.: An Approach for Measuring the Economical Efficiency of Aerial Fire Fighting Wildfire2011: The 5th Intl' Wildland Fire Conference: 09-13.05.2011.
8) English articles of Védelem Tudomány periodical (2017–2020)

Responsible for course:

(Ret) Lt. Col. Dr. habil. Ágoston Restás PhD, PhD, associate professor

Other teachers:

Title of the course: Dangerous substances and response	**Code:** HKDID7217A	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **30/10**

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

1. Classification of dangerous materials
2. (Physical and chemical) Properties of dangerous materials
3. Health effects of dangerous materials, toxicology
4. Reducing harmful effects of dangerous materials
5. Possibilities, instruments and solutions of response
6. Identification of dangerous materials.

Educational goal of subject - Competencies:

The course acquaints students with knowledge of dangerous materials. More specifically, the effects of dangerous materials, the possibilities to reduce these effects and the instruments of response are covered. Finally, students are introduced to the possibilities of identification of dangerous materials.

Required readings:

1. József DOBOR: Major Chemical Accidents in the 21st Century Europe and its Lessons Learned in Higher Education, Academic and applied research in military and public management science, ISSN: 2498-5392, 16: (3) pp. 93-108., 2017, Hadtudományi Bizottság A, https://www.uni-nke.hu/document/uni-nke-hu/AARMS_2017_03_06Dobor.pdf
2. U.S. Department Of Homeland Security, United States Fire Administration, National Fire Academy, FEMA: Hazardous Materials Incident Management, HMIM-Student Manual, 5th Edition, 1st Printing-April 2014
3. R. Craig Schroll: Industrial fire protection handbook, ISBN 1-58716-058-7, CRC Press LLC, 2002

Recommended readings:

1. U.S. Chemical Safety And Hazard Investigation Board: Final Investigation Report Report No. 2012-03-I-Ca January 2015 Chevron Richmond Refinery Pipe Rupture And Fire http://www.csb.gov/assets/1/16/Chevron_Final_Investigation_Report_2015-01-28.pdf
2. The University of Texas at Dallas: Chemical and Hazardous Materials Safety (2012) http://www.utdallas.edu/ehs/manuals/docs/chemical_safety_manual.pdf
3. Environmental Protection Agency: Hazardous Waste Identification (2005) http://www.epa.gov/waste/inforesources/pubs/training/hwid05.pdf

Responsible for course (name, position, scientific degree):
Dr. habil. József Dobor associate professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Disaster Management Tasks for the Safety of Critical Systems and Installations	**Code: HKDID7218A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **30/10**

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4

Pre-subject requirements *(if any)*: none

Course description:

1. System of tasks in industrial safety. The industrial safety authority. Methods for risk analysis.
2. Legislation in the EU, responsibilities, international cooperation.
3. Legislation related to the safety of critical systems and installations, their content and the proceedings of the authority.
4. The purpose and circumstances of the national and European identification and designation processes.
5. The role and national requirements of the safety liaison. The purpose and basic methods of the operator's safety plan.
6. The tasks and competence of the professional disaster management organisation. The register and inspection by the authority.
7. Review of horizontal criteria – tasks of the competent authority. Authority task of proposing.
8. The basics of network security.
9. Investigation and management of exceptional occurrences.
10. NDGDM as the coordinator of network security measures.
11. Execution of sectoral tasks

Competences:

Students receive a comprehensive overview of the national and international legislation on critical infrastructure. They define national, defence infrastructure and their characteristic installations. Students become acquainted with the sector-specific procedures of identification, planning, documentation, licensing and inspection related to the elements of the sectoral critical infrastructure.

Required readings:

1. Green Paper on an European programme for critical infrastructure protection – COM (2005) 576 final
2. Protecting Critical Infrastructure in the EU – CEPS Task Force Report; Centre for European Policy Studies, 2010, Brussels
3. Caitlin Durkovich: Working Together to Enhance Critical Infrastructure Resilience Around the Globe. IN: The CIP Report – Center for Infrastructure Protection and Homeland Security, May 2013 pp. 2-3.
4. Georgios Giannopoulos at all.: Risk assessment methodologies for Critical Infrastructure Protection. Part I: A state of the art. European Commission Joint Research Centre Institute for the Protection and Security of the Citizen. Ispra 2012. ISBN 978-92-79-23839-0 URL.: http://ec.europa.eu/home-affairs/doc_centre/terrorism/docs/RA-ver2.pdf

Recommended readings:

1. Tünde Bonnyai, Balázs Bognár: The process of critical infrastructure protection; Academic and Applied Research in Military Science, Vol. 8. issue 3. pp. 499-513. 2009., Budapest
2. Balázs Bognár, Judit Mógor: Concept and development of regulations on protection of critical infrastructures; (Chapter) The Best Practice of Training Handbook Critical Electric Energy Infrastrucures Protection, EU-ExTraH project: HOME/2009/CIPS/AG/C1-010, pp. 9-20., 2011., Budapest.
3. Kátai-Urbán Lajos: Handbook for the Implementation of the Basic Tasks of the Hungarian Regulation on „Industrial Safety" Budapest: Nemzeti Közszolgálati Egyetem, 2014. 73 p. (ISBN 978-615-5491-70-2)

Notes: -

Responsible for course:
BG. Dr. Bognár Balázs, PhD

Other teachers: -

Title of the course: Radiology	**Code:** HKDID7219A	**Credits: 3**

Type of lessons (lecture/seminar/consultation) and learning hours (full time training/part time training): 30/10

Knowledge assessment (exam/academic grade): exam

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

1) Basic knowledge in Radiochemistry, isotopetechnique and nuclear energetics
2) The use of radioactive isotopes in nuclear energetics, industry, medical institutions and other fields
3) Isotopes in nuclear energetics
4) Types characteristics and treatment of radioactive waste
5) Mesaurement of radioactive radiation (alpha, beta, gamma, neutron) and detectors
6) Characteriscs of environmental radioactivity
7) Use of radioactive isotopes in medical and diagnostical practice
8) Basic knowledge in dosimetry

Educational goal of subject - Competencies:

Student got information in the fields of radiochemistry isotope technics and nuclear energetics. Student learn about the environmental radioactivity, the mesaurement of radiations (alpha, beta, neutron), and dosimetry. The learn about the medical and diagnostical use of radioactive isotopes.

Required readings:

1. J. Shapiro, Radiation Protection, HARVARD UNIVERSITY PRESS Cambridge, Massachusetts, and London, England, www.ilea.ufrgs.br/radioisotopos/livroradio.pdf
2. DOE FUNDAMENTALS HANDBOOK, NUCLEAR PHYSICS AND REACTOR THEORY, Volume 1 and 2, JANUARY 1993 http://energy.gov/sites/prod/files/2013/06/f2/h1019v1.pdf http://www.steamtablesonline.com/pdf/Nuclear-Volume2.pdf

Recommended readings:

1. Pátzay, Gy ; Weiser, L ; Feil, F ; Patek, G: Analysis and Selective Treatment of Radioactive Waste Waters and Sludges in Waste Water: Chapter 9. In: Fernando, Sabastian Garcia - Fernando, Sabastian Garcia (szerk.) Waste Water- Evaluation and Management. Rijeka, Horvátország : InTech Education and Publishing, (2011) pp. 203-216. , 14 p.
2. Dávid, Havasi ; Ádám, Hajnal ; György, Pátzay ; László, T Mika. Vapor–Liquid Equilibrium of γ-Valerolactone and Formic Acid at JOURNAL OF CHEMICAL AND ENGINEERING DATA 62 : 3 pp. 1058-1062. , 5 p. (2017)

Responsible for course (name, position, scientific degree):
Prof. Em. György Pátzay, professor emeritus, PhD

Other teachers (name, position, scientific degree): -

Title of the course: **Disaster Management Monitoring Systems**	**Code: HKDID 7220A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **30/10**

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4.

Pre-subject requirements *(if any)*: none

Course description:

1. The purpose of environmental and disaster monitoring systems.
2. Environmental load, emissions and pollution.
3. Processes threatening human life, health and material goods.
4. Types, application, structure and operation of environmental monitoring systems.
5. Types, application, structure and operation of disaster monitoring systems.
6. Types, operation and application rules of mobile and stable reconnaissance devices for hazardous materials.
7. Structure and application of the Monitoring and Public Alert (MoLaRi) system.

Competences:

The course acquaints students with the theoretical and practical background on the use of environmental and disaster monitoring systems. They acquire knowledge on the structure, operation and the installation of monitoring systems.

Required readings:

1. Lees, F. P., (1996). Loss Prevention in the Process Industries, Second Edition, Butterworth-Heinemann, London. ISBN 0-7506-1547-8.
2. TNO: Methods for Calculation of Physical Effects of the Escape of Dangerous Materials (Liquids and Gases), Nederlands Organisation for Applied Scientific Research, Voorburg, Directorate-General of Labour.
3. Julianna, Ősz Bíróné ; Imre, Bojti ; Zsolt, Cimer ; Imre, Damjanovich ; Imre, Hoffmann ; Béla, Szakál ; Gyula, Vass ; Lajos, Kátai-Urbán (szerk.) Guidance on the implementation of regional and local tasks for the prevention of major accidents involving dangerous substances. Budapest, Magyarország : Akaprint Kft. (2005) , 114 p. ISBN: 9632191129

Recommended readings:

1. Kátai-Urbán, Irina ; Cimer, Zsolt ; Szakál, Béla ; Vass, Gyula. Risk Management in population protection. SCIENCE FOR POPULATION PROTECTION 11 : 2 pp. 1-8. , 8 p. (2019)

Note: -

Responsible for course: COL. Dr. Gyula Vass associate professor, PhD

Other teachers: -

Title of the course: Protection against Major Accidents	**Code: HKDID7226A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **30/10**

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4.

Pre-subject requirements *(if any)*: none

Course description:

1. International, EU and national legislation related to the protection against major accidents involving dangerous materials.
2. Fulfilment of operator obligations. Content and formal requirements of safety documents and their inspection.
3. Preparing, reviewing and applying internal and external safety plans.
4. Tasks and procedures related to public information and publicity. Report, information and inspection related to malfunctions and accidents involving dangerous materials.
5. Sanctions system and their imposition on dangerous establishments.
6. Authority regulations on technical, organisational and management measures to mitigate risks and consequences and their implementation by the operator.
7. The system and content of settlement planning. Designation of danger zone.
8. Methodology and procedure of authority tasks related to licensing, supervising and inspecting.

Competences:

Students are introduced to international and national legislation related to the protection against major accidents involving dangerous materials; industrial safety and disaster management procedures of the operator and the authority as well as the methods of risk analyses supporting them.

The course acquaints students with the procedures of inspection of safety documents in dangerous establishments, with special regard to the inspection procedures of risk analysis as well as external safety plans and public information.

Required readings:

1. Kátai-Urbán Lajos: Handbook for the Implementation of the Basic Tasks of the Hungarian Regulation on „Industrial Safety" Budapest: Nemzeti Közszolgálati Egyetem, 2014. 73 p. (ISBN 978-615-5491-70-2)
2. Kátai-Urbán L.: Establisment and Operation of the System for Industrial Safety within the Hungarian Disaster Management. ECOTERRA: JOURNAL OF ENVIRONMENTAL RESEARCH AND PROTECTION (ISSN: 1584-7071) 11: (2) pp. 27-45. (2014)
3. Lajos Kátai-Urbán (ed.): Guidance on the implementation of regional and local tasks for the prevention of major accidents involving dangerous substances.Budapest: Akaprint Kft., 2005. pp. 40-53. (ISBN: 963 219 112 9)

Recommended readings:

1. Kátai-Urbán Lajos, Vass Gyula: Safety of Hungarian Dangerous Establisments - Review of the Industrial Safety's Authority. HADMÉRNÖK IX.:(1) pp. 88-95. (2014)

Notes: -

Responsible for course:
COL. Dr. habil Lajos Kátai-Urbán associate professor, PhD

Other teachers: COL. Dr. habil. Gyula Vass PhD, associate professor

Title of the course: Carriage and Logistics of Dangerous Goods	**Code: HKDID7228A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **30/10**

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4.

Pre-subject requirements *(if any)*: none

Course description:

1. Comprehensive assessment of international and national legislation. Criteria for the transport of hazardous materials by road, rail, air and inland waterway.
2. Dangerous goods logistics. Preparation for transport of goods. Storage and warehousing of dangerous goods. Rules for cargo securing.
3. The specifics of risk management and safety planning in establishments for dangerous goods transport.
4. Disaster management tasks and authorities of industrial supervision.

Competences:

This course provides a comprehensive understanding of theoretical and practical issues related to the safe transport and logistics of dangerous materials and goods. Students are introduced to the authorities, tasks and procedures set out in sectoral and international and national disaster management legislation related to the state supervision over transportation of dangerous goods.

Required readings:

1. UN Economic Commission for Europe: European Agreement concerning the International Carriage of Dangerous Goods by Road ADR applicable as from 1 January 2015. URL.: www.unece.org/trans/publications/dg_adr_2015.html (letöltés: 2015.05.15.)
2. UN Economic Commission for Europe: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways URL.: www.unece.org/index.php?id=38257&L=0 (letöltés: 2015.05.15.)

Recommended readings:

1. Kátai-Urbán Lajos: Handbook for the Implementation of the Basic Tasks of the Hungarian Regulation on „Industrial Safety" Budapest: Nemzeti Közszolgálati Egyetem, 2014. 73 p. (ISBN 978-615-5491-70-2)
2. Kátai–Urbán Lajos; Kiss Enikő: Inspection of the Transportation of Dangerous Goods by Inland Waterways in Hungary. ACADEMIC AND APPLIED RESEARCH IN MILITARY SCIENCE (ISSN: 1588-8789) (eISSN: 1788-0017) 13: (2) pp. 261-266. (2014)

Notes: -

Responsible for course:

COL. Dr. habil. Gyula Vass PhD, associate professor

Other teachers:

COL. Dr. habil Lajos Kátai-Urbán associate professor, PhD

Title of the course: Planning, Organising and Executing Technical Rescue	**Code: HKDID7229A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) and learning hours (full time training/part time training): 30/10

Knowledge assessment (colloquium/academic grade/ other): colloquium

The course place in the curricula (in which semester): 2-4 semester

Pre-subject requirements *(if any)*: *none*

Course description

Organisational elements guaranteeing first intervention, technical rescue capabilities in Hungary and Worldwide. Their operation and typical intervention, technical rescue situations. The process, frame and elements, technical equipment of the technical rescues by the disaster management, fire units.

Educational goal of subject - Competences:

Developing wide knowledge about the organisation, staff and technology related to first interventions in Hungary and Worldwide. Ability to determine the requirements of certain situations, technical rescues.

Required readings:

1. Péter PÁNTYA: The basic equipments for protection of Hungarian firemen, BOLYAI SZEMLE 20:(1) pp. 9-18. (2011), ISSN 1416-1443
2. Péter PÁNTYA: Fire equipment capabilities testing results, Košická Bezpečnostná Revue 7:(2) pp. 105-113. (2017) ISSN 1338 – 6956
3. Péter PÁNTYA: What can help for the Firefighters?, Zvolen: Technicka Univerzita v Kosiciach, 2015. 10 p., Advances In Fire & Safety Engineering, (ISBN:9788022828239)

Recommended readings:

1. PÁNTYA Péter, RESTÁS Ágoston, HORVÁTH Lajos: Disaster Management of Fire Protection View of Hungary, In: A J Jordaan, Ionel Hajdu-Kinga Ivan, Agoston Restas, etc., Environmental Legislation, Safety Engineering and Disaster Management: ELSEDIMA 10th Edition: Book of Abstracts. 197 p., Romania, Cluj-Napoca: EFES, 2014., (ISBN:978-973-606-526-183-9)
2. Pántya, Péter: Fire, Rescue, Disaster Management. Experiences from Different Countries, Academic and Applied Research in Military and Public Management Science 17 : 2 pp. 77-94. , 18 p. (2018)
3. László, Bodnár ; Péter, Pántya: The Threat of Forest and Vegetation Fires and the Possibilities of Intervention in Hungary, Academic and Applied Research in Military and Public Management Science 18 : 3 pp. 21-31. , 11 p. (2019)

Responsible for course (name, position, degree): Dr. Péter PÁNTYA, PhD., associate professor

Other teachers (name, position, degree): -

Title of the course: Planning, Organising and Executing Firefighting	**Code: HKDID7230A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **30/10**

Knowledge assessment (exam/academic grade): **Colloquium**

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

1. Regulation of the operations, technical rescue and disaster response activities of disaster management.
2. Dislocation of fire departments, the system of alarm and assistance.
3. The basics of staff service organisation. Organising fire fighting and technical rescue and the basics of on-duty service.
4. Management and procedure of fire fighting.
5. Management and procedure of technical rescue.

Competences:

This course provides a comprehensive understanding of regulations related to firefighting, technical rescue and disaster response. Students are introduced to the rules on organising firefighting and technical rescue as well as the conditions of safe interventions and technical rescue and their technical and organisational components.

Required readings:

1. Restás Á.: A Model for Firefighting Managers Making Decisions in Emergencies Proceedings of the 11th International Conference on Naturalistic Decision Making Marseille, France, 21-24.05.2013.
2. Bodnár László, Restás Ágoston, Xu Qiang: Conceptual Approach of Measuring the Professional and Economic Effectiveness of Drone Applications Supporting Forest fire Management, PROCEDIA ENGINEERING 211: (2018) pp. 8-17.
3. Restás, Á.: An Approach for Measuring the Economical Efficiency of Aerial Fire Fighting Wildfire2011: The 5th International Wildland Fire Conference: Sun City, South Africa, 09-13.05.2011.

Recommended readings:

1. Restás Á.: R-20 Method: An approach for measuring the isolation effect of foams used fighting forest fires AARMS 11:(2) pp. 233-247. (2012)
2. Assigned firefighting and fire investigating studies

Responsible for course (name, position, scientific degree):
Dr. habil. Restás Ágoston associate professor, Eng., PhD, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Population protection	**Code: HKDID7238A**	**Credits: 3**

Type of lessons (**lecture**/seminar/consultation) **and learning hours** (full time training/part time training): full time training: 30 hours, part time training: 10 hours

Knowledge assessment (exam/academic grade): **exam**

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: *no*

Course description:

- Description of the structure and operation of the professional disaster management organization system, legal bases defining the activities of disaster management.
- The purpose of the civil protection field, its main tasks in the period of prevention, protection and elimination of consequences.The importance of the risk assessment procedure and emergency planning for the protection of the population.
- Municipal tasks related to the field of civil protection. The connection of the local bodies of the professional disaster management organization system to the performance of municipal disaster management tasks.
- Significance and methods of public protection in the event of natural disasters by presenting case studies.
- Industrial safety aspects of civil protection. Civil protection tasks of local governments.The professional connections of the fire brigade in the field of public protection.

Educational goal of subject - Competencies:

During the lessons, the student should get acquainted with the operation of the professional disaster management organization system, paying special attention to the field of civil protection. Be able to identify the importance of risk identification, the links between emergency planning and public protection measures. Based on the knowledge acquired in the course, you should get to know the fire protection and industrial safety professional connections of the public protection, as well as the public protection tasks of the local governments.

Required readings:

1. Zsuzsanna Priváczki-Juhászné Hajdu, Árpád Muhoray: Improving resilience of settlements situated in plain areas in relation to inland excess water flood and drought risk POLGÁRI VÉDELMI SZEMLE 13 : Különszám pp. 238-266. , 29 p. (2020)
2. Sándor Nagy: The developmentof the risk assessment and risk management related to the protection of the population, author's presentation and official reviews of Doctoral (PhD) dissertation, University of Public Service, 2019.

Recommended readings:

1. Brigitta Sáfár: Deployment of standardized emergency response units in large scale emergencies MŰSZAKI KATONAI KÖZLÖNY 28 , 10 p. (2018)
2. Réka Magdolna Rácz: Outline of floods as well as flood prevention and flood protection activities in Hungary Academic And Applied Research In Military Science (AARMS) 10 : 1 pp. 123-129. , 7 p. (2011)

Responsible for course (name, position, scientific degree): Réka Kirovné Dr. Rácz, PhD.

Other teachers (name, position, scientific degree): -

Title of the course: Risk management of industrial technologies	**Code:** HKDID7239A	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **20/6**

Knowledge assessment (exam/academic grade): **exam**

Knowledge assessment (exam/academic grade): 2-4.

Pre-subject requirements *(if any)*: none

Course description:
General knowledge of hazardous substances: the concept of hazardous substances in different legal environments, physico-chemical parameters determining the properties of hazardous substances, safety data sheet.
Description of the most commonly used hazard analysis methods: fault tree analysis, hazard and operability study, Failure mode and effects analysis. The role of human error.
Consequence analysis: event tree analysis, reference event. Dangerous substance dispersion and consequence modelling, interpretation of results.
Concept of risk, steps of risk analysis, determination of individual risk and social risk. Input data and uncertainty for software modelling. Interpretation of results.
Risk management: definition and quantification of risk mitigation measures. Consideration of non-quantifiable risk mitigation measures.
Doctoral students will learn acquire the methods used to identify the hazards of industrial technologies and assess the consequences. Able to perform industrial safety assessments of industrial technologies, formulate risk reduction measures.

3-5 most important mandatory and elective references (author, edition, pages, ISBN)

Required readings:

1. Center for Chemical Process Safety (1989). Guidelines for Chemical Process Quantitative Risk Analysis. A.I.Ch.E., Center for Chemical Process Safety, NY. ISBN 0-8169-0402-2.
2. Lees, F. P., (1996). Loss Prevention in the Process Industries, Second Edition, Butterworth-Heinemann, London. ISBN 0-7506-1547-8.
3. TNO (1999, Purple Book). Committee for the Prevention of Disasters. CPR 18E . Guidelines for Quantitative Risk Assessment. The Director-General of Labour, The Netherlands

Recommended readings:

1. Szakál B, Cimer Zs: Major Disaster Recovery Plans. SCIENCE FOR POPULATION PROTECTION 6:(1) Paper Szakál, Cimer. 7 p. (2014)
2. Szakál B, Cimer Zs.: Analyses of professional dilemma surfaced when drafting the respective Hungarian regulations. SCIENCE FOR POPULATION PROTECTION 2:(2) pp. 1-13. (2010)
3. Szakál B, Cimer Zs. Analysing difficulties of risks arising from the storage of explosive materials. ANNUAL NEWS OF THE SZENT ISTVÁN UNIVERSITY YBL MIKLÓS FACULTACY OF BUILDING SCIENCES 8:(1) (2008)

Notes : -

Responsible for course: Dr. Cimer Zsolt PhD, associate professor

Other teachers: -

Title of the course: Basic knowledge in radiation protection and nuclear accident preparedness	**Code:** HKDID7418A	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **20/6**

Knowledge assessment (exam/academic grade): term mark

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

1) Radiation protection, radiological funds, dosimetry
2) The use of radioactive materials in everyday life
3) The importance of nuclear power generation and risks
4) The radiation protection authorities, inspection services
5) Description of nuclear accidents occurring in recent decades
6) Monitoring systems in our country and in Europe
7) Emergency preparedness tools, opportunities, achievement

Educational goal of subject - Competencies:

The course students acquire knowledge of radiation protection and the radiology. Within this measurement networks, organizations responsible for radiation protection, nuclear accidents have occurred in recent decades, and the mitigation and remediation possibilities toolkit also get to know the students.

Required readings:

1. J. Shapiro, Radiation Protection, HARVARD UNIVERSITY PRESS Cambridge, Massachusetts, and London, England, www.ilea.ufrgs.br/radioisotopos/livroradio.pdf
2. DOE FUNDAMENTALS HANDBOOK, NUCLEAR PHYSICS AND REACTOR THEORY, Volume 1 and 2, JANUARY 1993 http://energy.gov/sites/prod/files/2013/06/f2/h1019v1.pdf http://www.steamtablesonline.com/pdf/Nuclear-Volume2.pdf

Recommended readings:

1. Pátzay, Gy ; Weiser, L ; Feil, F ; Patek, G: Analysis and Selective Treatment of Radioactive Waste Waters and Sludges in Waste Water: Chapter 9. In: Fernando, Sabastian Garcia - Fernando, Sabastian Garcia (szerk.) Waste Water- Evaluation and Management. Rijeka, Horvátország : InTech Education and Publishing, (2011) pp. 203-216. , 14 p.
2. Dávid, Havasi ; Ádám, Hajnal ; György, Pátzay ; László, T Mika. Vapor–Liquid Equilibrium of γ-Valerolactone and Formic Acid at JOURNAL OF CHEMICAL AND ENGINEERING DATA 62 : 3 pp. 1058-1062. , 5 p. (2017)

Responsible for course (name, position, scientific degree):
Prof. Em. György Pátzay, professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: **Case studies of Industrial Safety**	**Code:** HKDID7419A	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): 20/6

Knowledge assessment (exam/academic grade): term mark

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

1. The definition, organisation (fields of activity, functions) of industrial safety
2. Professional evaluation of major national incidents
3. Professional evaluation of major European incidents
4. Response to incidents and the importance of (national and international) drills

Educational goal of subject - Competencies:

The course acquaints students with knowledge of industrial safety. More specifically, incidents over the last decades relevant to industrial safety are covered. Finally, students are introduced to the possibilities of interventions and the importance of drills.

Required readings:

1. Edited by Andre Richardt, Birgit H¨ulseweh, Bernd Niemeyer, Frank Sabath: CBRN Protection, Managing the Threat of Chemical, Biological, Radioactive and Nuclear Weapons, ePDF ISBN: 978-3-527-65019-4, Wiley-VCH Verlag & Co. KGaA, Boschstr., 2013
2. Ratan Raj Tatiya: Elements of Industrial Hazards Health, Safety, Environment and Loss Prevention, ISBN: 978-0-203-83612-5 (eBook - PDF), CRC Press Taylor & Francis Group, 2010
3. Philip E. Hagan, John F. Montgomery, James T. O'Reilly: Accident prevention manual for business & industry engineering & technology, ISBN 0-87912-213-7, National Safety Council, 12th edition, Illinois, 2001
4. Nicolas A. Valcik and Paul E. Tracy: Case studies in disaster response and emergency management, ISBN 978-1-4398-8317-4 (eBook - PDF), CRC PressTaylor & Francis Group, 2013

Recommended readings:

1. Anthony D. Manley: Security Manager's Guide to Disasters Managing Through Emergencies, Violence, and Other Workplace Threats, CRC PressTaylor & Francis Group, ISBN 978-1-4398-0906-8 (Book), 2009
2. Dobor József: Major Chemical Accidents in the 21st Century Europe and its Lessons Learned in Higher Education, Academic and applied research in military and public management science, ISSN: 2498-5392, 16: (3) pp. 93-108., 2017, Hadtudományi Bizottság A, https://www.uni-nke.hu/document/uni-nke-hu/AARMS_2017_03_06Dobor.pdf

Responsible for course (name, position, scientific degree):
Dr. habil. József Dobor associate professor, PhD

Other teachers (name, position, scientific degree): -

Title of the course: Risk and Consequence Analyses in the field of Industrial safety	**Code: HKDID7420A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **20/6**

Knowledge assessment (exam/academic grade): **term mark**

Knowledge assessment (exam/academic grade): 2-4.

Pre-subject requirements *(if any)*: none

Course description:

The basics of chemical safety. Identifying below-tier establishments dealing with dangerous materials.

1. Analyses of risk sources. Internationally accepted methods for analysis, their methodology and application.
2. Identifying major accidents involving dangerous materials, analysing their consequences, determining and ranking the frequency of their occurrence.
3. Identifying individual and societal risks.
4. Technical, organisational and managerial measures to mitigate the risks and consequences.
5. Individual risk for injury and designating danger zone.

Competences:

Students become acquainted with the identification of dangerous activities, review of safety documentation and management systems, the technical requirements as well as the application of risk- and consequence analysing software with sample-scenarios.

Required readings:

1. Center for Chemical Process Safety (1989). Guidelines for Chemical Process Quantitative Risk Analysis. A.I.Ch.E., Center for Chemical Process Safety, NY. ISBN 0-8169-0402-2.
2. Lees, F. P., (1996). Loss Prevention in the Process Industries, Second Edition, Butterworth-Heinemann, London. ISBN 0-7506-1547-8.
3. TNO (1999, Purple Book). Committee for the Prevention of Disasters. CPR 18E . Guidelines for Quantitative Risk Assessment. The Director-General of Labour, The Netherlands

Recommended readings:

1. Szakál B, Cimer Zs: Major Disaster Recovery Plans. SCIENCE FOR POPULATION PROTECTION 6:(1) Paper Szakál, Cimer. 7 p. (2014)
2. Szakál B, Címer Zs.: Analyses of professional dilemma surfaced when drafting the respective Hungarian regulations. SCIENCE FOR POPULATION PROTECTION 2:(2) pp. 1-13. (2010)
3. Szakál B, Címer Zs. Analysing difficulties of risks arising from the storage of explosive materials.ANNUAL NEWS OF THE SZENT ISTVÁN UNIVERSITY YBL MIKLÓS FACULTACY OF BUILDING SCIENCES 8:(1) (2008)

Responsible for course: Dr. Cimer Zsolt PhD, associate professor

Other teachers:

Prof. Dr. habil. Szakál Béla, PhD, college professor

Title of the course: **Fire prevention activities**	**Code: HKDID 7423A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **20/6**

Knowledge assessment (exam/academic grade): **term mark**

The course place in the curricula (in which semester): 2-4 semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: none

Course description:

Legislation on fire prevention, legislative environment. Basic related concepts. Basic guidelines in fire prevention planning, risk-based planning. Fire safety requirements of building materials and building structures, performance indicators. Requirements of evacuation. Creating conditions for interventions. General rules for fire alarms and sprinklers. Installation and regular maintenance. Flammable liquids and melts. General fire protection rules of their use.

Educational goal of subject - Competencies:

This course provides students with a basic understanding of fire prevention. They receive a comprehensive and detailed overview of basic guidelines and concepts in fire protection and fire safety requirements of buildings. Students are introduced to the conditions that ensure fire interventions through practical examples. The course acquaints students with practical knowledge on fire protection equipment and rules on their installation and use.

Required readings:

1. National Fire Prevention Rules (Act)
2. Legislation in force of fire prevention (BM OKF)
3. Restás Á.: R-20 Method: An approach for measuring the isolation effect of foams used fighting forest fires AARMS 11:(2) pp. 233-247. (2012)

Recommended readings:

1. Fire protection technical directives (BM OKF)
2. Restás, Á.: An Approach for Measuring the Economical Efficiency of Aerial Fire Fighting Wildfire2011: The 5th International Wildland Fire Conference: Sun City, South Africa, 09-13.05.2011.

Responsible for course (name, position, scientific degree):
Dr. habil. Restás Ágoston associate professor, PhD, PhD

Other teachers (name, position, scientific degree): -

Title of the course: The Safety of Firefighter Interventions.	**Code: HKDID7424/a**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) and learning hours: 20/6

Knowledge assessment (colloquium/academic grade/ other): academic grade

The course place in the curricula (in which semester): 2-4. semester

Pre-subject requirements *(if any)*: *none*

Description - **Knowledge:**

During the firefighter interventions, examining safety of intervention, including the issues of safety of victims, the intervention teams and the success of the intervention. Organizational elements guaranteeing first intervention capabilities, the circumstances of interventions, the options to improve the safety.

Educational goal of subject - **Competences:**

The knowledge of the primary interventions, situations at the scene, the first responder forces and technical opportunities. Competences to find danger sources at the different scenes, to discover the best ways of protection against them.

Required readings:

1) Péter PÁNTYA: What Can Help for the Firefighters?, Zvolen: Technicka Univerzita v Kosiciach, 2015. 10 p., Advances In Fire & Safety Engineering, (ISBN:9788022828239)
2) Péter PÁNTYA: The issue of safety during the interventions of fire fighting units of disaster management, In: NISPAcee Government vs. Governance in Central and Eastern Europe: From Pre-Weberianism to Neo-Weberianism? Presented Papers from the 22nd NISPAcee Annual Conference. Budapest, Hungary, 2014., (ISBN:978-80-89013-72-2)
3) Péter PÁNTYA: Fire equipment capabilities testing results, Košická Bezpečnostná Revue 7:(2) pp. 105-113. (2017) ISSN 1338 - 6956

Recommended readings:

1) PÁNTYA Péter, RESTÁS Ágoston, HORVÁTH Lajos: Disaster Management of Fire Protection View of Hungary, In: A J Jordaan, Ionel Hajdu-Kinga Ivan, Agoston Restas, etc., Environmental Legislation, Safety Engineering and Disaster Management: ELSEDIMA 10th Edition: Book of Abstracts. 197 p. Romania, Cluj-Napoca: EFES, 2014., (ISBN:978-973-606-526-183-9)
2) Martin ZACHAR, Andrea MAJLINGOVÁ, Iveta MITTEROVÁ, Péter PÁNTYA: The Proposal of Methodology to Investigate the Passenger Cars Fires, BOLYAI SZEMLE 26:(2) pp. 45-56. (2017)

Recommended websites: www.vedelem.hu, www.katasztrofavedelem.hu

Responsible for course (name, position, degree): Dr. Péter Pántya, PhD., assistant professor PhD

Other teachers (name, position, degree):

Title of the course: Relationship between disasters and the geographic space	**Code: HKDID7426A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) and learning hours: N: 20 ó./L: 6 ó.

Knowledge assessment (colloquium/academic grade/ other): **academic grade** - mid-semester evaluation

The course place in the curricula (in which semester): **2-4.** semester

Pre-subject requirements *(if any)*: *none*

Description - **Knowledge:**
The relationship between security and geography. Geographical evaluation of the continents from security and disasters points of view. Consequences of natural disasters and its security relations on the example of the continents (Europe, Asia, Africa, Central and South America, Australia). The effects, consequences and implications of man-made disasters, and their relationship with security (nuclear power stations, chemical, biological and radiological accidents etc.) Geographical evaluation of Hungary (geographical location, physical, social, and economic geography) from the point of view of security and disasters. Individual preparation of the Case Study of a given country, a region or sub-region evaluation from the disaster geographical point of view.

Educational goal of subject - **Competencies:**
The doctoral students learn about and are aware of security and geo-spatial relationship, the use of geographic information systems in the emergence and prevention of disasters, each continents' and Hungary's physical, economic and social geographical specificities, the geographical knowledge that fundamentally determine security, their impact on security and geography of disasters.

Required readings:
Siposné Kecskeméthy Klára: Katonaföldrajzi szócikkek, [Military Geography] In: Forgács Balázs et alii. (Szerk.) Hadtudományi Lexikon, Új kötet, Budapest, Ludovika Egyetemi Kiadó (2019). ISBN 978-963-531-101-9 (In Hungarian)
The Federal Response to Katrina Hurricane Lessons Learned, February 2006, The White House, Washington, p. 228. http://library.stmarytx.edu/acadlib/edocs/katrinawh.pdf
Tamás, Almási ; Klára, Siposné Kecskeméthy: The health risks of global warming and climate change – The Yamal peninsula case In: Michal, HRNČIAR (szerk.) Zborník príspevkov z 9. medzinárodnej vedeckej konferencie, Liptovskỳ Mikuláš, Akadémia ozbrojených síl generála Milana Rastislava Štefánika, (2018) pp. 16-28.
http://www.aos.sk/struktura/katedry/kbo/NMB2018/Zbornik_NMB2018.pdf

Recommended readings:
Daniel Moran, Editor: Climate Change and National Security A Country-Level Analysis ISBN: 9781589017412 (1589017412)
Special Report on the Nuclear Accident at the Fukushima Daiichi Nuclear Power Station, INPO-11-005, November 2011. Institute of Nuclear Power Operations. Atlanta
https://hps.org/documents/INPO_Fukushima_Special_Report.pdf
Richard Sharpley and Philip R. Stone: The Darker Side of Travel, The Theory and Practice of Dark Tourism, Channel View Publication, Bristol-Buffalo-Toronto, 2009. p. 286.

Responsible for course (name, position, degree): Prof. Klára Sipos Kecskeméthy CSc

Other teachers (name, position, scientific degree): -

Title of the course: Safety Engineering	**Code: HKDID6216A**	**Credits: 3**

Type of lessons: lecture/seminar/***consultation*** **and learning hours**: Lecture *30/10 hours* / Consultation: *4*

Knowledge assessment (exam/academic grade): ***exam***

The course place in the curricula (in which semester):

Pre-subject requirements *(if any)*: *none*

Course description:
Theoretical background of reliabilityand technical sefety. The components' and systems' reliability. Reliability of Systems with Complex Interconnections. Reserving methods. The human factors. Fault Tree Analysis (FTA); Event Tree Analysis (ETA); Ishikawa analysis; Failure Mode and Effects Analysis (FMEA); Pareto analysis; Root Cause Analysis (RCA); Monte Carlo Simulation (MCS).

Educational goal of subject - Competencies:
To give a general overview about the role of the sefety enginering in the military operations, as well as make a basis of methods of technical reliability focus on the military equipment operations and maintenance.

Required readings:

1. Bauer, E., Zhang, X., Kimber D.A., "Practical System Reliability", John Wiley & Sons, 2009.
2. Myers, "Complex System Reliability" Springer-Verlag, 2010.
3. Ushakov, "Handbook of Reliability Engineering", John Wiley & Sons, 1994.

Recommended readings:

1. Pokorádi, László, MODELS IN SAFETY MANAGEMENT, MACHINE DESIGN 11 : 3 pp. 85-94. , 10 p. (2019).

Responsible for course (name, position, scientific degree): Prof. .Dr. Pokorádi László, full professor, CSc (technical sciences)

Other teachers (name, position, scientific degree): –

Title of the course: **Modelling of Technical Systems**	**Code: HKDID6217A**	**Credits: 3**

Type of lessons: lecture/seminar/***consultation*** **and learning hours**: Lecture *30/10 hours* / Consultation: *4*

Knowledge assessment (exam/academic grade): ***exam***

The course place in the curricula (in which semester):

Pre-subject requirements *(if any)*: *none*

Course description:
Theoretical background of system emgineering, modelling of technical systems. Clasiffication of models. Methodology of mathematical modeling. One- and Multi-parametrical Sensitivity Analysis. The dimensional Analysis. The stateestimation methods. Modell uncertainties.

Educational goal of subject - Competencies:
To give a general overview about the role of mathematical modelling of technical systems, as well as make a basis of the mathemaztical model-based investigation of military equipment.

Required readings:

1. Heinz, Mathematical Modeling, Springer Heidelberg Dordrecht London New York, 2011.
2. Pokorádi, László, Szabolcsi, Róbert, Mathematical Models Applied to Investigate Aircraft Systems, nomográfia, Monographical Booklets in Applied and Computer Mathematics, MB-12, PAMM, Műegyetemi Kiadó, Budapest, 1999., p. 146.
3. Baoding L., Uncertainty Theory, Springer, Berlin, 2010. p. 350

Recommended readings:

1. Pokorádi László Logical Tree of Mathematical Modeling, THEORY AND APPLICATIONS OF MATHEMATICS & COMPUTER SCIENCE 5 : 1 pp. 20-28. , 9 p. (2015).
2. Pokorádi László, Graph model-based analysis of technical systems, IOP CONFERENCE SERIES: MATERIALS SCIENCE AND ENGINEERING 393 : 1 Paper: 012007 , 8 p. (2018).

Responsible for course (name, position, scientific degree): Prof.Dr. Pokorádi László, full professor, CSc (technical sciences)

Other teachers (name, position, scientific degree): –

Title of the course: **Modelling of Maintenance processes**	**Code: HKDID6218A**	**Credits: 3**

Type of lessons: lecture/seminar/***consultation*** **and learning hours**: Lecture *30/10 hours* / Consultation: *4*

Knowledge assessment (exam/academic grade): ***exam***

The course place in the curricula (in which semester):

Pre-subject requirements *(if any)*: *none*

Course description:
Theoretical background of maintemance management. Strategies of maintenance. Clafisications of failures. Aging theory. Application of theory of Markov-processes ti investigate maintenance processes. The modern maintenance philosophies, Total Productive Management, Realibility Centered Management.

Educational goal of subject - Competencies:
To give a general overview about the role of maintenance and maintenance management in the military operations, as well as make a basis of modern, mathematical modell-based maintenance management of military equipment.

Required readings:

1. Riccardo Manzini, Alberto Regattieri, Hoang Pham, Emilio Ferrari, Maintenance for Industrial Systems, Springer-Verlag, London, 2010.
2. Jardin A.K.S., Tsang A.H.C. Maintenance, Replacement, and Reliability: Theory and Applications. New York: Taylor & Francis, 2006.
3. Karlin, S., Taylor H.M. A First Course in Stochastic Processes. London: Academic Press, 1985.

Recommended readings:

1. Pokorádi László, Availability assessment with Monte-Carlo simulation of maintenance process model POLYTECHNICAL UNIVERSITY OF BUCHAREST. SCIENTIFIC BULLETIN. SERIES D: MECHANICAL ENGINEERING 78 : 3 pp. 43-54. , 12 p. (2016)
2. Pokorádi László, MODELS IN SAFETY MANAGEMENT, MACHINE DESIGN 11 : 3 pp. 85-94. , 10 p. (2019)

Responsible for course (name, position, scientific degree): Prof. Dr. Pokorádi László, full professor, CSc (technical sciences)

Other teachers (name, position, scientific degree): –

Title of the course: Automatic Flight Control Systems of the UAVs	**Code: HKDID8210A**	**Credits: 3**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): 30 /10 Hrs

Knowledge assessment (exam/academic grade): Exam (E)

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: -

Course description: Mathematical models of the spatial motion of the UAV. Classical (SISO) and modern (MIMO) models of the UAV spatial motion. Open and closed loop automatic flight control systems of the UAVs. Computer aided design of the UAV autopilots and flight control systems. Controler synthesis using classical approach (pole placement). Controller synthesis using optimal LQR, LQG, LQG/LTR methods. Controller synthesis using robust H2 and Hinf methods.

Educational goal of subject - Competencies: Ability to understand and solve closed loop synthesis and scheduling problems using MATLAB

Required readings:

1. McLean, D. Automatic Flight Control Systems. Prentice-Hall, 1990.
2. Stevens, B.L., Lewis, F.L. Aircraft Control and Simulation. New York, USA, Wiley-Interscience, 1992.
3. Nelson, R.C. Flight Stability and Automatic Control. McGraw-Hill International Editions, ISBN 0-07-046273-9, 1998.
4. Stevens, B.L., Lewis, F.L., Johnson, E.N: *Aircraft Control and Simulation: Dynamics, Control Design and Autonomous Systems*. Wiley-Blackwell, 3rd Edition, 2015.

Recommended readings:

1. Valavanis, K.P. (ed.) Advances in Unmanned Aerial Systems. Springer, ISBN 978-1-4020-6113-4, 2007.
2. Austin, R. Unmanned Aircraft Systems – UAVs Design, Development and Deployment. John Wiley & Sons, Ltd., ISBN 978-0-470-05819-0, 2010.
3. Beard, R.W., McLain, T.W.: Small Unmanned Aircraft. Thoery and Practice. Princeton University Press, ISBN 978-0-0691-14921-9, 2012.
4. Yedavalli, R.K.: *Flight Dynamics and Control of Aero and Space Vehicles*. John Wilwy & Sons, Ltd., 2020.

Responsible for course (name, position, scientific degree): Prof. Dr. Szabolcsi Róbert

Other teachers (name, position, scientific degree): —

Title of the course: Human Factors in flight safety, causes of sudden incapacitation and human error from the aspects of Human-System Integration, possible countermeasures and prevention by tools of ergonomy and technical-technological solutions	**Code: HKDID6415A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): **research seminar: full time training: 20 hrs/ part time training: 6 hrs**

Knowledge assessment (exam/academic grade): **G (Practice note)**

The course place in the curricula (in which semester): depends on the individual educational program **3.-4. semester**

Pre-subject requirements *(if any)*: --

Course description:

Educational goal of subject Regarding the mutual dynamic relationship between man-machine-environment settings in aviation the weakest chain is the human factor, analysis of flight safety factors influencing the actual performance and working capacity of the pilot is a must. To interrupt the chainlink ending in air accident a systemic approach is necessary, considering the selection of the best applicants, their regular medical assessment for fitness for flight, mental and physical performance enhancement, continuous development of Human-System Integration and cockpit ergonomic elements. New medical evaluation of stressz tolerance with new protocols in ground based simulation is very important.

Competencies: Analysis of Human Factor's role in aviation especially considering the aeromedical stress assessment.. New effective „real-time" biomedical monitoring for cardiovascular adaptive responses. Assessment of predicitive validity for selection processes through analysis of stress tolerance. Comprehension of psychic and cognitive regenerative capibility after air accidents/medical treatment (medication). Stress level limitation by preventive measures in altitude physiology and ergonomy related technologies. Protocol development and test execution in ground-based simulated aeromedical stressor situation, preparing for real flight data recordings.

Required readings:

1. HUM.ET1.ST13.3000-REP-02 Human Factors in the Investigation of Accidents and Incidents. https://www.eurocontrol.int/sites/default/files/content/documents/nm/safety/safety-human-factors-module-human-factors-in-the-investigation-of-accidents-and-incidents-1998.pdf
2. Human Performance and Limitations in Aviation 3rd edition Editor: M. Bagshaw, R D Campbell, ISBN:0632059656
3. Handbook of Aviation Human Factors. 2nd Ed. Editors: John A. Wise, V. David Hopkin, Daniel J. Garland. CRC Press Taylor and Francis Group. 6000 Broken Sound Parkway NW, Suite 300Boca Raton, FL 33487-2742 ISBN 978-0-8058-5906-5

Recommended readings:

1. Fundamentals of Aerospace Medicine Ed.: Jeffrey R. Davis, MD, MS 4th Edition, 2008 By Lippincott Williams & Wilkins, A Wolters Kluwer Business, 2002, 1996, 1986 by Lippincott Williams & Wilkins, ISBN 978-0-7817-7466-6
2. HUMAN ERROR – James Reason, Cambridge University Press 1990. New York, ISBN 978 0 521 31419 0 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1070929/)
3. Human Performance and Limitations in Aviation 3rd edition Editor: M. Bagshaw, R D Campbell, ISBN:0632059656

Responsible for course (name, position, scientific degree): ***Col. Dr. habil.Sándor SZABÓ, PhD, Chief Flight Surgeon of Hungarian Defence Forces***

Title of the course: Programming in MATLAB	**Code: HKDID8409A**	**Credits: 2**

Type of lessons (lecture/seminar/consultation) **and learning hours** (full time training/part time training): 20/6 Hrs computer lab

Knowledge assessment (exam/academic grade): **-**

The course place in the curricula (in which semester): 2-4. semester (depends on the individual educational program)

Pre-subject requirements *(if any)*: -

Course description: MATLAB basics. Matrix calculus. Analysis of basic terms in time and in frequency domain. Open loop and closed loop control systems analysis in time and in frequency domain. Controller synthesis using classical approach (pole placement). Controller synthesis using optimal LQR, LQG, LQG/LTR methods. Controller synthesis using robust H2 and Hinf methods.

Educational goal of subject - Competencies: Ability to understand and solve closed loop synthesis and scheduling problems using MATLAB

Required readings:

1. Burns, R. S. *Advanced Control Engineering*: Butterworth-Heinemann, Oxford-Auckland-Boston-Johannesburg-Melbourne-New Delhi, 2001.
2. Nise, N. S. *Control Systems Engineering,* John Wiley & Sons, Inc., 2004.
3. Dorf, C.R., Bishop, R.H.: Modern Control Systems. Pearson Education Limited, Edinburg Gate, 2014.

Recommended readings:

1. Szabolcsi, R. Korszerű szabályozási rendszerek számítógépes tervezése. ZMNE, ISBN 978-615-5057-26-7, p415, 2011.
2. Szabolcsi, R.: *Szabályozáselmélet*. Budapest, Óbudai Egyetem, ISBN 978-963-449-188-0, 2019, p470.
3. Szabolcsi, R.: *Irányítástechnikai rendszerek tervezése és vizsgálata MATLAB® környezetben*. Budapest, Óbudai Egyetem, ISBN 978-963-449-187-3, p398, 2020.

Responsible for course (name, position, scientific degree): Prof. Dr. habil. Róbert Szabolcsi (PhD)

Other teachers (name, position, scientific degree): -