MISKOLCI EGYETEM

Institute of Logistics

www.alt.uni-miskolc.hu

MISKOLCI EGYETEM

UNIVERSITY OF MISKOLC

Promotion Guide

The purpose of this promotion guide is to provide you with up-to-date information related to the Institute of Logistics at the University of Miskolc.

This document is making no claim to be exhaustive but it is presenting the overall research and innovation activities at the Institute and its most significant achievements.

This Promotion Guide about the Institute of Logistics at the University of Miskolc has been prepared in the framework of the UMi-TWINN project funded by the European Union's Horizon 2020 research and innovation Programme (Grant Agreement No 691942).

2016 UMi 2018 TWINN

A word from the head of the Institute

Prof. Béla Illés

Logistics is a very important field of the industrial sciences in our days. Because of this situation the education and research activities on this field play very important role in the economical processes. The Institute of Logistics is involved in many different activities from the development of educational programmes to research and innovation works and projects.

Our Institute is the part of the Faculty of Mechanical Engineering and Informatics, but we have a wide range of educational activities also at two other Faculties at the University of Miskolc (e.g. Faculty of Economics and Faculty of Materials Science and Engineering) at BSc and MSc levels.

Furthermore the Institute provides educational activity in the two Doctoral Schools of the Faculty of Mechanical Engineering and Information technology. The popularity of the logistics topics and subjects is confirmed by the number of students (e.g. about 100 students every year) who prepare successful diploma theses. Helping the internationally reputed theoretical education modern laboratories provides for students the possibility of knowing the processes, technologies and devices applied in practice.

The Institute of Logistics has also a wide range of research and development activity in many fields related to logistics and materials handling. We are taking part in many European, national and industrial research projects. Our partners are national and international institutes, large and medium-sized companies.

The University of Miskolc

The University of Miskolc (Miskolci Egyetem) is the largest university of Northern Hungary.

1735

The predecessor of the University of Miskolc was the school of mining and metallurgy (Bergschule) established by Charles III in Selmecbánya, which was the world's first higher education institution giving instruction in these fields (in Freiberg, courses were launched in 1765, in Berlin in 1770, and in St Petersburg in 1773).

1762

Maria Theresia gave the school academy status (Bergakademie). Later, the Selmec school served as a model for the establishment of European technical colleges.

1794

Paris Technical University organised its laboratory trainings on the basis of the Selmec system. The world's first international technical society, in which 14 countries were represented, was founded with the contribution of Selmec professors in Szklenó, not far from Selmecbánya.

1867

Following the Austro-Hungarian compromise, German was replaced by Hungarian as the language of instruction, and the name of the institution was changed to Magyar Királyi Bányászati és Erdészeti Akadémia ('Royal Hungarian Academy of Mining and Forestry').

1920

As a result of the Trianon peace treaties, Selmec became part of Czechoslovakia and the academy had to move to Sopron.

1949

The Hungarian National Assembly ordered that 'in order to enhance higher education in technology, a university of heavy industry be established in Miskolc. The university shall be divided into the faculties of mining and metallurgical engineering.'

1981

The first Law courses started and an independent Faculty of Law was established in 1983.

1990

The name of the university was officially changed to University of Miskolc and the Faculty of Economics established.

1997

The technical faculties continue their activities as Faculties of Earth Science and Engineering, Materials Science and Engineering and Mechanical Engineering and Informatics.

2001

The first bachelor programme of the Institute of Healthcare was launched in 2001 to train district nurses, and in 2004, the instruction of physiotherapists was also started. In 2005, the institute was given faculty status.

Faculty of Earth Science and Engineering
www.mfk.uni-miskolc.hu

Faculty of Materials Science and Engineering
www.mak.uni-miskolc.hu

Faculty of Mechanical Engineering and Informatics
www.gepesz.uni-miskolc.hu

Faculty of Law
www.jogikar.uni-miskolc.hu

Faculty of Economics
www.gtk.uni-miskolc.hu

Faculty of Arts
www.bolcsesz.uni-miskolc.hu

Faculty of Healthcare
www.ek.uni-miskolc.hu

Bartók Béla Music Institute
www.bbzi.uni-miskolc.hu

Faculty of Mechanical Engineering and Informatics

The Faculty of the Mechanical Engineering and Informatics offers different level of study programmes in technological and IT fields. Students can pursued their academic education at the Faculty from a Bachelor to a Doctoral degree including Master and Post-graduate programmes

At the Faculty, there are two centres of excellence presented below:

- ***Mechatronics and Logistics Excellence Centre***: its main activity consists in research on the application of intelligent equipment for the purpose of the improvement of economic competitiveness. Research projects based on the integration of automation, informatics, logistics and mechatronics technologies are conducted by three dedicated teams of experts.

- ***Innovative Mechanical Design and Technologies Excellence Centre***: is composed of seven research teams working in the field of: Innovative material technologies; Research into precision finishing technologies; Research into mechanical and alternative fuels; Innovative mechanical product development; Applied mechanics research; Optimum modelling of metal structures, application of new algorithms; Development of innovative environment-friendly technologies and enhancement of energy efficiency in the chemical industry.

The Institute of Logistics

'Logistics' has been identified as one of the Smart Technologies for Hungary.

National Smart Specialisation Strategy, National Innovation Office, 2014

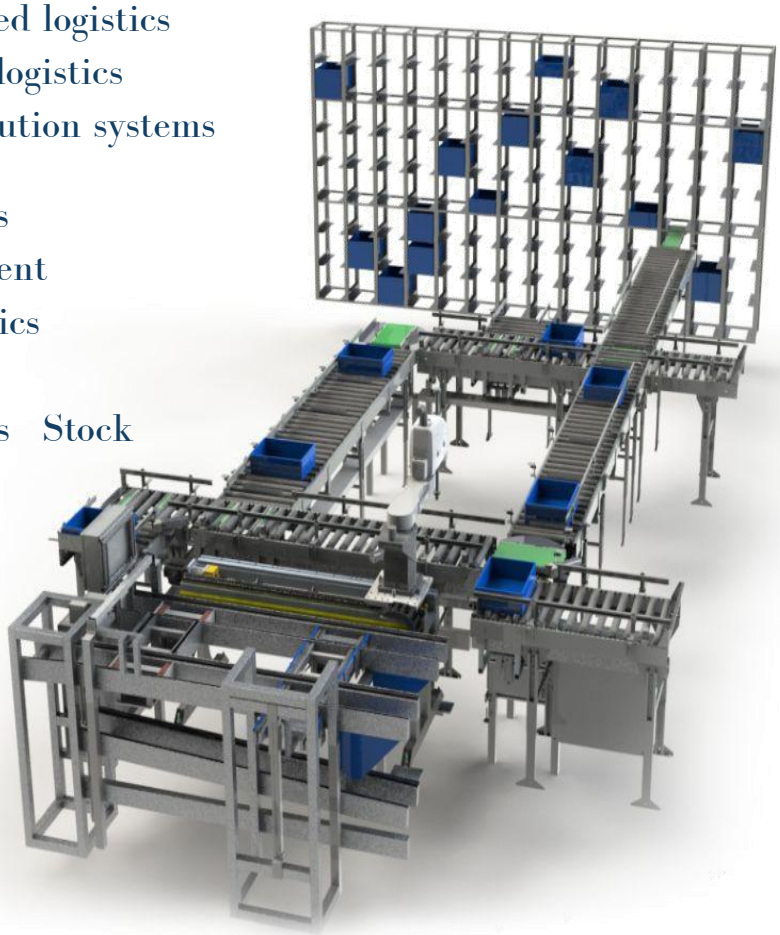
The ancestor of the Institute was founded in 1951 under the name "Department of Levering Machines". In the 80's the department launched its first educational programme on logistics. It is only in 2013, the department changed status and became the Institute of Logistics.

The Institute conducts its main education activities in the field of logistics at the Faculty of Mechanical Engineering and Informatics, as well as at the Faculty of Economics. It is an important educational and research centre in the domain, both in Hungary and abroad.

The Institute of Logistics has been actively participating in the elaboration of industrial research projects at national and international levels.

The main research and innovation areas at the Institute are:

- ❖Control and planning methods for modular materials handling systems
- ❖Computer integrated logistics
- ❖Quality insurance logistics
- ❖Supply and distribution systems
- ❖Production logistics
- ❖Logistics management
- ❖Maintenance logistics
- ❖Logistics services
- ❖Recycling logistics Stock management
- ❖Stock management



Research and Innovation Projects

"First, have a definite, clear practical ideal; a goal, an objective.
Second, have the necessary means to achieve your ends; wisdom, money, materials, and methods.
Third, adjust all your means to that end."

Aristotle

Thanks to its numerous contacts with academic and industrial actors, the Institute of Logistics at the University of Miskolc implemented a large number of research, technological development and innovation (RDI) projects over the last years.

2016 UMi 2018 TWINN	**Reinforce the scientific excellence and innovation capacity in logistics technology at UMi**	
	Start/end date	01/01/2016 - 31/12/2018
	Funding source	European Commission's Horizon 2020
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The UMi-TWINN project aims at boosting the University of Miskolc and twinning partners' scientific excellence and innovation capacity in logistics technology, as well as implementing a research and innovation strategy focused on three sub-topics:

- Design of logistic systems and networks;
- Intelligent transport systems;
- Dynamical analysis of materials handling machines.

The project will interact with Hungarian and European actors in order to benefit the various industries requiring support and development activities in logistics technology. The coordinator of the project and main beneficiary, the University of Miskolc, will closely work with three European-leading organisations in the field of logistics and technology transfer, namely: Fraunhofer IFF (Germany), Technical University of Graz (Austria) and Intelligentsia Consultants Sàrl (Luxembourg).

	MACS+ Membrane action in fire design of composite slab with solid and cellular steel beams	
	Start/end date	2011 - 2013
	Funding source	European Commission's Research Fund for Coal and Steel (RFCS)
Contact Person	Name:	Dr. Karoly JARMAI
	Email:	altjar@uni-miskolc.hu
	Phone:	(+36) 46 565 11

Full scale fire tests have revealed that the fire performance of global composite floor systems could be much higher than that obtained in standard fire tests with isolated structural parts. A new innovative and simple design method was developed on the basis of large scale tests. More experimental evidences have been obtained about good behaviour in long duratio

	DIFISEK+ DIssemination of Structural FIre Safety Engineering Knowledge throughout Europe	
	Start/end date	01/07/2007 - 30/06/2008
	Funding source	European Commission's Research Fund for Coal and Steel (RFCS)
Contact Person	Name:	Dr. Karoly JARMAI
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	Phone:	(+36) 46 565 11

The technical objective is to disseminate Structural Fire Safety Engineering Knowledge gained in recent ECSC&RFCS funded projects to practicing engineers in various countries, in their own languages. This project will extend a previous RFCS project entitled DIFISEK that covered a few European countries and will now cover nearly all European countries. Another objective is to update the material for fire design prepared in the first project (according EN version) and to implement Eurocode National Annexes.

JEM Járműipari felsőoktatási és kutatási együttműködési megállapodás	**Cooperation between higher education, research institutes and automotive industry**	
	Start/end date	15/04/2013 - 16/04/2015
	Funding source	Széchenyi 2020
Contact Person	Name:	Dr. Béla Illés
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Development of collaboration between automotive companies and the educational institutions through the elaboration of joint research topics and educational materials in the field of electric vehicles. The consortium was composed of five academic partners (Széchenyi István University, University of Miskolc, University of Pannonia, Óbuda University, Kecskemét College) and more than 25 automotive companies including Audi Hungaria Motor Ltd. And Mercedes-Benz Manufacturing Ltd.		

MISKOLCI EGYETEM UNIVERSITY OF MISKOLC	**Improving the quality of higher education on the basis of the development of Centres of Excellence in strategic research fields of the University of Miskolc**	
	Start/end date	01/03/2011 - 29/05/2013
	Funding source	Széchenyi 2020
Contact Person	Name:	Dr. Agota Banyai
	Email:	altagota@uni-miskolc.hu
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The main objectives of this project were to enhance the scientific activities with the increase of qualitative publications and R&D research projects. In the frame of this project the University of Miskolc has defined four primary multi-disciplinary excellence centres, including the Mechatronics and Logistics Centre in which the Institute elaborated not less than ten (10) R&D topics and published more than 100 qualitative papers.		

Audi Hungaria	**Simulation examination of the small-scale body parts manufacturing for the AUDI Hungaria Motor Ltd.**	
	Start/end date	01/03/2011-15/08/2011.
	Funding source	Industrial contract
Contact Person	Name:	Dr. Béla Illés
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The automotive enterprises apply simulation methods for the examination of their complex material flows. The aim of the project was to realise a simulation investigation model to determine the storage capacities between the operations and the optimal positions of the technological equipments. A Plant Simulation framework, developed at the Institute, has been used and the simulation model examination has been performed with relative frequency diagrams related to the used storage areas and the built-in software functions of the simulation framework.

Tudás - profit	**Application of the logistics knowledge transfer for the creation and improvement of the regional logistics networks and clusters**	
	Start/end date	01/10/2009 - 30/09/2011
	Funding source	Social Renewal Operational Programme (TÁMOP)
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The project aimed at generating and transferring knowledge relevant to logistics networks and clusters. The project involved the University of Miskolc and the University of Security Management of Kassa (Slovakia) and obtained the following results:

- Economic analysis and evaluation for the Miskolc-Kassa Region.
- Elaboration of a Virtual Logistics Centre for the Miskolc-Kassa Region.
- Improvement of the knowledge related to logistics networks and clusters.
- Realisation of educational curricula within the Regional Logistics Network

The projects presented before are just examples but the Institute of Logistics has been involved in many other RDI projects:

National projects:

- OTKA K63591: Theoretical establishment of integrated logistics system of mechatornical products manufacturing-assembling processes (Dr. Béla Illés)
- OTKA T75678: Economic design of welded structures (Dr. Károly Jármai)
- TÁMOP-4.1.2-08/1/A-2009-0001: Elaboration of e-learning materials in topic of advanced materials, nano- and engineering technologies (Dr. Illés Béla)
- TÁMOP-4.1.2-08/1/A-2009-0049: Virtual enterprises, e-government, IT and communication technologies (Dr. Béla Illés)
- TÁMOP-4.2.1-08/1-2008-0006: Establishment and operation of Technology- Knowledgetransfer Centre of University of (Dr. Béla Illés)

Industrial projects:

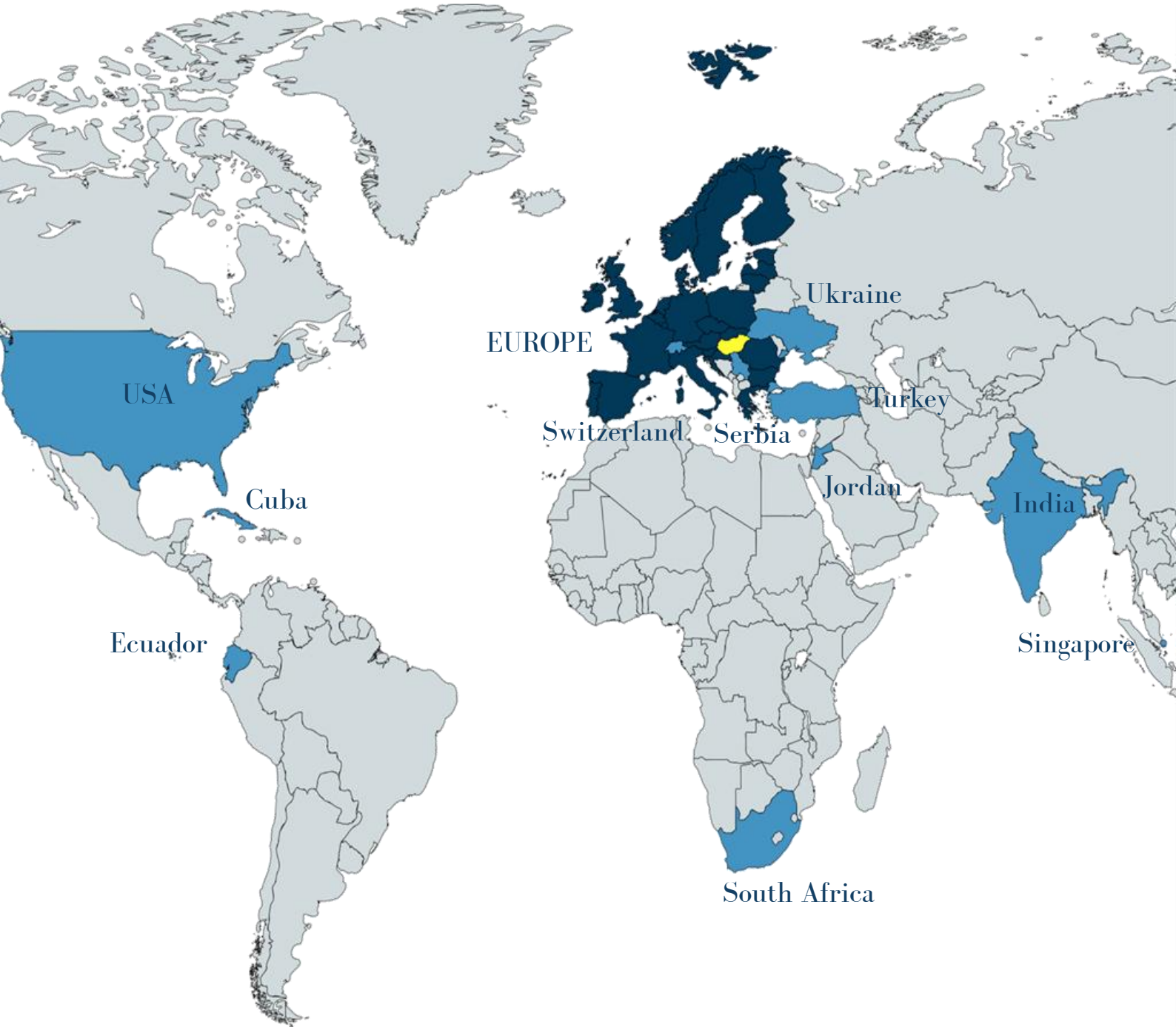
- "Mechanical and experimental investigation of a special ramp attachment for moving high mass data storage equipments " IBM Data Storage Systems Ltd.
- "Elaboration of a FIFO principled raw material warehousing system"; Bosch Rexroth Pneumatika Ltd.
- "Implementation of a innovative software component"; DHL Global Forwarding
- "Operation analysis and improvement of a finished goods carrying and storage system"; Electrolux Lehel Ltd.
- "Planning of the manufacturing logistics of "Megapack" / "Gigapack" components, focuses on the storing activity between manufacturing"; IBM Data Storage Systems & Information Technology Ltd.
- "Dynamic analysis of cranes"; Konecranes Ltd.
- Etc.

International Cooperation

"It is probably not love that makes the world go around, but rather those mutually supportive alliances through which partners recognise their dependence on each other for the achievement of shared and private goals."

Fred A. Allen

Geographical coverage of partners and collaborators



Academic Partners

ULBS
Universitatea "Lucian Blaga" din Sibiu

le cnam

SAPIENTIA
HUNGARIAN UNIVERSITY OF TRANSYLVANIA

THE TECHNICAL UNIVERSITY of CLUJ-NAPOCA

TU/e Technische Universiteit Eindhoven University of Technology

POLITECHNIKA CZĘSTOCHOWSKA

hochschule aschaffenburg
university of applied sciences

TU WIEN

POLITECHNIKA POZNAŃSKA
POZNAN UNIVERSITY OF TECHNOLOGY

Technische Universität München

TU Graz
Graz University of Technology

OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

ETH zürich

HoME
HOCHSCHULE MERSEBURG FH
University of Applied Sciences

technische universität dortmund

Technische Universität Berlin

IZMIR UNIVERSITY OF ECONOMICS

NUS
National University of Singapore

1885 XIII

UNIVERSITAS WRATISLAVIENSIS

UNIVERSITAS PRESOVIENSIS 1997

UNIVERSIDAD CENTRAL "MARTA ABREU" DE LAS VILLAS
VERITATE SOLA NOBIS IMPONETUR VIRTUS TOGA
SANTA CLARA 1948

Fraunhofer
IFF

TECHNICKÁ UNIVERZITA V KOŠICIACH

ŽILINSKÁ UNIVERZITA
UNIVERSITAS SOLNENSIS

Industrial Partners

FESTO
DHL
IBM
Digiterm medical equipment
TAKATA
SBS
ÁTI Depo Közraktározási Zrt.
XANGA
JABIL
SCHAEFFLER
WENSTECH
AkzoNobel Tomorrow's Answers Today
unus pro omnibus Észak-magyarországi Közlekedési Központ Zrt.
trilak a festékmester by PPG
TGMI Kft
Rexroth Bosch Group
KONECRANES
HORVÁTH RUDOLF INTERTRANSPORT KFT
DIRECT-LINE KFT.
TMB Hungary Kft.
GE
LINAMAR Power to Perform
Electrolux
Audi Hungaria
CLAAS
ZEISS
ISD DUNAFERR
ME MÁTRAI ERŐMŰ ZRT.
FUX ZÁRTKÖRŰ RÉSZVÉNYTÁRSASÁG
ÁTI DEPO ZRt.
NEMZETI MOBILFIZETÉSI ZRT.

Scientific Events

"Share your knowledge.
It's a way to achieve immortality."

Dalai Lama

Central European Conference on Logistics - CECOL

The Central European Conference on Logistics (CECOL) aims to enhance joint research and innovation activites, improve curriculum and stimulate knowledge transfer in the special field of logistics. CECOL provides a high-level international platform for academicians and practitioners from all over the world, to present their latest research results.

CECOL is a successful conference taking place at different location of the central European zone, such as Miskolc, Hungary (2010), Czestochowa, Poland (2011), Trnava, Slovak Republic (2012) and Magdeburg, Germany (2013), etc.

The founders and organisers of the CECOL conference are:

MultiScience Conference - microCAD

The microCAD conference is an international and multidisciplinary event organised every year by the University of Miskolc. It usually takes place around April and gathers international participants, from Europe and worldwide, involved in logistics research and innovation activities. The Institute of Logistics is the main organiser of this event.

The primary aim of the conference is to give an opportunity to Hungarian and foreign experts, from senior researchers to PhD students, to present their latest results in the accredited scientific fields of the University of Miskolc. The microCAD conference also offer the opportunity to establish and cultivate personal and professional relations.

The microCAD conference has a number of symposiums on the following topics:

- ❖Sustainable National Resources Management
- ❖Applied Materials Science and Nanotechnology
- ❖Mechatronics and Logistics
- ❖Innovative Mechanical Design and Technology
- ❖Service and Institutional Operation in the Frame of Information Society

Proceedings and Journal

As any international scientific events, the microCAD conference proposed a proceedings composed of the selected scientific papers presented during the conference.

The proceedings is available for download on the conference website: http://www.uni-miskolc.hu/~microcad/

The Institute of Logistics at the University of Miskolc is also preparing the 'Advanced Logistic Systems - ALS' Journal which presents the results of the Institute and their international partners in a serially publication.

The journal is registered in several journal databases (Google Scholar, Repec, Matarka, etc.) so the papers are appearing on many places of the internet. The ALS journal is available at: http://web.alt.uni-miskolc.hu/als/

Educational programme

"Education is the most powerful weapon which you can use to change the world."

Nelson Mandela

Doctoral School of Information Sciences

Material Handling Systems and Information engineering for Logistics

Type: PhD

Duration: 6 semesters

The technical and scientific professional background of the Doctoral School is provided by the Faculty of Mechanical Engineering and Informatics at the University of Miskolc. As a result, the training of engineers focuses mainly on the academic fields of mechanical applied information technology.

This course provides students with deeper knowledge of the theory of discrete mathematics, stochastic processes, optimisation procedures, information systems, artificial intelligence methods, operating systems, data structures, computer networks, data transfer systems, logistics systems and material handling systems as well as the academic fields of these manufacturing and service providing global systems operating in networks, putting emphasis on an IT approach.

More information on the Doctoral school are available at this link.

Online courses - MEMOOC Platform

Researchers and professors at the Institute of Logistics developed a number of online courses relevant to logistics technologies. They have used the platform MEMOOC to reach a wider audience for their lectures, and they developed courses in both Hungarian and English.

Find below a list of online courses developed by the Institute of Logistics' team on MEMOOC platform:

Basics of logistics

Identification code: IT.L1.BASICS.0.E / IT.L1.BASICS.0.H

Duration: 25 hours

❖To introduce fundamentals of logistics systems that are widely applicable in practice;

❖To introduce the main principles implemented in logistics education at the Institute of Logistics, which include the solving of diverse practical problems and using rather sophisticated mathematical modeling and problem solving tools;

❖ To provide information from the state-of-the-art international professional literature and problems that build upon the wide spectrum of R&D activities carried out at UMi.

Simulation methods in logistics

Identification code: IT.L1.SYMULATIONS.0.E / IT.L1.SYMULATIONS.0.H

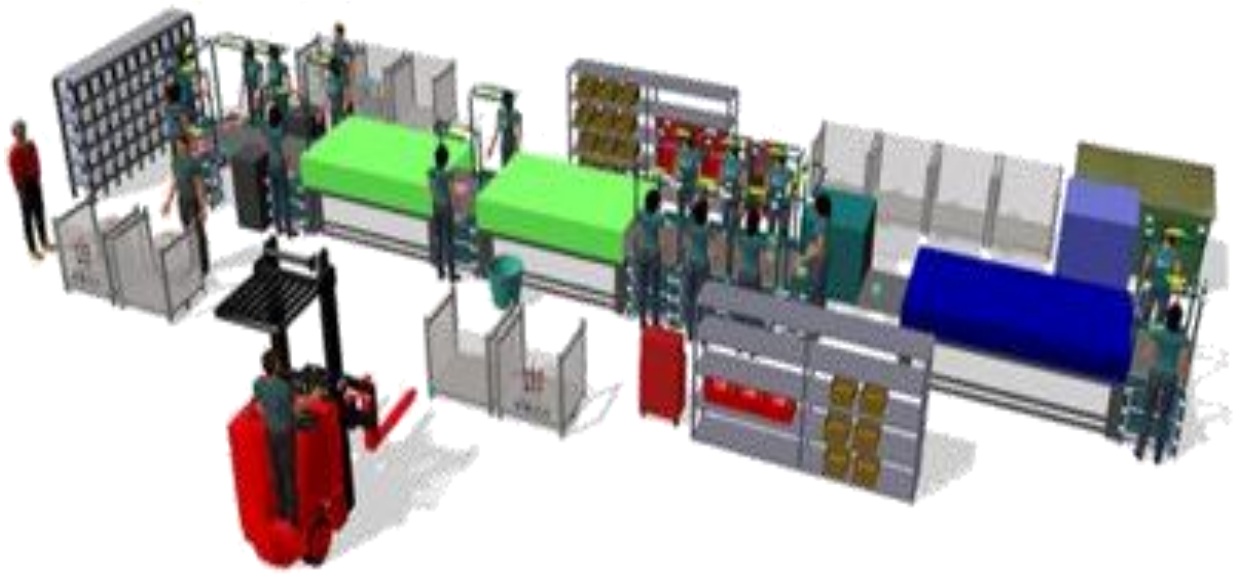
Duration: 25 hours

This online course includes 2 theoretical lessons and 8 lessons focused on practical issues.

The world around us is a very complex and multi-parametric system, like the weather, traffic, operation of machines, production processes, etc. Understanding of the characteristics, operation and behavior of these systems and processes is not easy due to their complexity.

In this course UMi is focusing on the simulation of logistical processes. The most common application field of simulation software is the analysis of production processes.

The course will introduce the theoretical background of simulation and show the application of the Plant Simulation Program. UMi will introduce basic objects, functions and modules of the program through a lot of simple examples and case studies.



The Institute of Logistics' equipments

"Mathematics is the cheapest science. Unlike physics or chemistry, it does not require any expensive equipment."

George Pólya

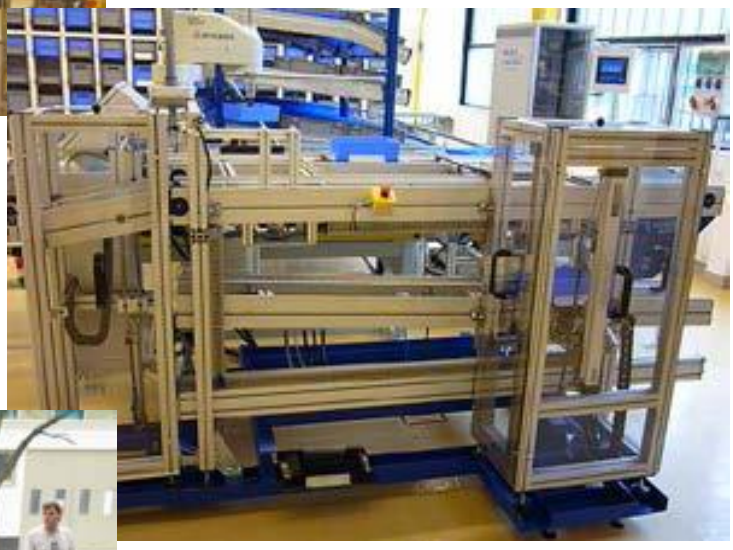
Beside the internationally reputed theoretical education at the Institute of Logistics, modern laboratories provide students the possibility of learning with practice and therefore increase the knowledge transfer.

The educational and research activities of the Institute are supported by the following laboratories:

- ***The Automated logistics and identification laboratory*** contains an automated PLC controlled warehouse, a PLC controlled automate pallet handling system, a portal robot and a powered roller conveyor system.
- ***The Order picking and identification-technique laboratory*** has a state of the art order picking system with barcode and radio frequency identification.
- ***The Integrated identification and logistics laboratory*** includes a robot cell, a modular manufacturing system, a mobile robot and all of the elements apply barcode and radio frequency identification system. Planning and simulation software are also available for the improvement of students knowledge.

Powered roller conveyor system

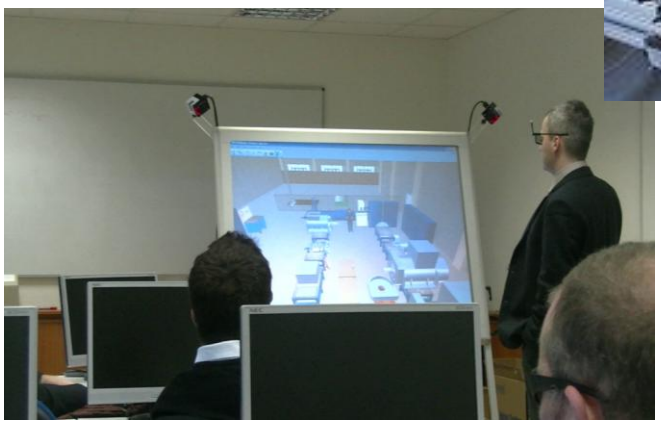
14-8 levels rack shelf system



Pallet management cell

Linear axis including SCARA industrial robot-system

Integrated identification and logistics laboratory



Virtual Logistics Laboratory

- ❖Stereoscopic visualization system
- ❖Motion-capture based tracking-system, interaction devices
- ❖Virtual reality development and training software (VDT Platform)
- ❖Development of virtual reality environments for logistics applications
- ❖Training activities using virtual reality environments, practical education

Meet the staff of the Institute

"When people are financially invested, they want a return.
When people are emotionally invested, they want to contribute."

Simon Sinek

Head of the Institute

Prof. Béla Illés

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Prof. Béla Illés is graduated from the University of Heavy Industry in Miskolc and passed his PhD thesis in 1997. Since 2006, Prof. Illés is the vice president of the Logistical subcommittee part of the Traffic Committee of the Hungarian Academy of Sciences.

He is a honorary professor at the University of Cluj-Napoca (Romania) and at the University Central "Marta Abreu" (Cuba). Prof. Illés is also a foreign member of the Ukrainian Academy of Sciences since 2011. His research interests cover the following topics:

- Design methods of materials handling machines,
- Logistics of maintenance,
- Logistics of quality assurance,
- Logistical networks,
- Service systems of logistics.

Prof. Béla Illés research results have been published in more than 185 scientific papers and his educational lectures in the field of logistics are recognised worldwide.

Prof. György Kovács
Vice-head of the Institute

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Prof. Kovács graduated in 1998 from the Faculty of Mechanical Engineering at UMi. He is a lecturer on different logistics subjects for BSc and MSc students and he is highly invovled in research activities at the Institute. He is leader, author and co-author of many studies and scientific research. He participated to several EU and national R&D projects (e.g. FP5, Interreg, PHARE) while leading industrial R&D projects.

Prof. Tamás Bányai
Associated professor

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He graduated in 1993 from the University of Miskolc, Faculty of Mechanical Engineering as a mechanical engineer. Since then he worked at the Institute of Logistics as a PhD student (thesis on the design of mobile robot systems) and research assistant until 2001 when Prof. Bányai became associate professor. He published more than 100 papers topics relevant to mathematical modelling and optimisation of logistics systems; heuristic optimisation of networked service systems. Prof. Bányai participated to several EU and national R&D projects.

Prof. Péter Telek
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He graduated in 1996 from the University of Miskolc, Faculty of Mechanical Engineering as a mechanical engineer. In 1996 he worked at the Institute as a PhD student and since 1999 as an assistant professor. He is a lecturer of different logistics subjects for BSc and MSc students. His research interests covers the design of material handling systems and the design and optimisation of logistics systems

Prof. Ágota Bányai
Associated professor

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She received her PhD degree in 1999 (design of just-in-time purchasing systems). Her research interests cover mathematical modelling and design of logistics systems; optimisation of supply chain systems; design of purchasing and distribution processes. She has published more than 100 scientific papers in these fields. Prof. Bányai was involved in numerous R&D project especially for industrial partners.

Prof. Péter Tamás
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He graduated at University of Miskolc in 2006, as a mechanical engineer and he passed his PhD degree at the same university in 2012 (thesis on the elaboration of outsourcing examination model and method for the finished goods storage systems). He was involved in more than 40 R&D industrial projects and published about 60 scientific publications.

Dr. László Kota
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He graduated in 2000 is MS.c. engineer of informatics and then he worked at the Department of Materials Handling and Logistics as a PhD student and since 2015 as an assistant professor. He is giving lectures on different logistics subjects for BSc and MSc students. His research areas are the following: optimization of logistic systems, logistic related informatics and programming, software and database design and implementation, business automatisation and design of logistics systems.

Dr. Róbert Skapinyecz
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He graduated in 2009 from Budapest University of Technology and Economics. In 2009 he started his PhD studies at the Department of Materials Handling and Logistics, enrolled in the József Hatvany Doctoral School of Information Science and Technology. In 2012, he started to work at the Institute as an applied engineer and since 2014, he has been working as an assistant lecturer.

Mr.. Richárd Bálint
Master teacher

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He graduated in 1999 from the University of Miskolc, Faculty of Mechanical Engineering as a MSc. in information engineering. Since 2000 he worked at the Department of Materials Handling and Logistics as an assistant lecturer on different logistics subjects for BSc and MSc students. His research areas are the following: design and optimisation of logistic systems; optimised resource-management in logistic networks.

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