

VIRTUAL WINTER SCHOOL

RAIL | TRANSPORT | LOGISTICS

Where does the future take us?

7 - 11 FEBRUARY 2022
(MONDAY - FRIDAY)

- ◇ **e-Certificate** upon completion
- ◇ **50% off processing fee** when applying for one of our Master of Science programmes offered at TUM Asia
- ◇ **20% off Winter School fee** for TUM/TUM Asia alumni & students (including the incoming students for our AY2022/23 intake)

VIRTUAL WINTER SCHOOL 2022

Experience an engaging and unforgettable time in a one-of-a-kind virtual learning experience during your school break this Winter. The TUM Asia Virtual Winter School 2022 is designed to be an enriching programme for international students from all walks of life, embracing a mix of academic topics alongside insights into Singapore culture.

TUM Asia's Winter school will have two parallel streams focusing on land transport and logistics/supply chain management.

Both streams will give an insight into multiple facets of transportation engineering and logistics/supply chain management that can shape our lives in the near future. The lessons will be divided into fundamentals and will touch upon the latest developments as well as ongoing trends in these focus areas. The way these ongoing developments influence global commerce, manufacturing techniques and supply chains will be discussed.

During the Winter School, participants will be introduced to the Master's programme in Rail, Transport and Logistics offered at TUM Asia. The theme of the Winter School resonates with the concepts taught in this programme, thereby giving participants a firm idea on what to expect once they join the Master's programme.

The future of urban logistics will be discussed. Examples and stories on major innovations in the field of logistics and supply chain management, discussions on the benefits, new burdens and risks which come with those innovations, and what that means for career opportunities to students will be shared during the Winter School.

New trends in automated mobility solutions and technologies used to implement autonomous driving will be shown. The focus of the Winter School will be to touch upon the development of new automated transport concepts and the challenges that arise while operating a mixed fleet of automated and driver steered vehicles sharing the same road space. An example of infrastructure supporting development of transportation technologies like new innovative pavement concepts that enable inductive charging of electric vehicles during driving will be shown during the winter school.

ABOUT



PROGRAMME SCHEDULE (LOGISTICS)

Monday 7 February - 4 hours 15 minutes	Morning	Welcome to TUM Asia Introduction to the Basics of German Language
	Afternoon	Industry 4.0 Introduction
Tuesday 8 February - 4 hours	Morning	Technologies Transforming Warehousing
	Afternoon	The Future of Urban Logistics
Wednesday 9 February - 3 hours	Afternoon	How Logistics is Changing the World
	Evening	Logistics 4.0 as an Enabler for Future Factories
	Afternoon	How E-Commerce Works and How will it Change Our Shopping in the Future
Thursday 10 February - 4 hours	Evening	Challenges for Industrial Supply Chains: Automation, Sustainability and Resilience are Major Trends to Reshape Future Supply Chains
Friday 11 February - 1.5 hours	Morning	Student Presentation

PROGRAMME SCHEDULE (RAIL/TRANSPORT)

Monday 7 February - 4 hours 15 minutes	Morning	Welcome to TUM Asia Introduction to the Basics of German Language
	Afternoon	Industry 4.0 Introduction
Tuesday 8 February - 4 hours	Morning	Dynamic Autonomous Road Transit (DART) system: A New Innovative Public Transport System
	Afternoon	Modelling and Optimisation of Transportation Systems
Wednesday 9 February - 4 hours	Morning	Engineered Cementitious Composites for Electrified Roadway Application in Singapore
	Afternoon	Integrated land use/transport modelling to explore the impact of more radical scenarios on greenhouse gas emissions
Thursday 10 February - 4 hours	Morning	Redesigning Pick-Up-Drop-Off Points to accommodate Autonomous Vehicles
	Afternoon	High-speed and mass transit rail technology
Friday 11 February - 1.5 hours	Morning	Student Presentation



INDUSTRY 4.0

HIGHLIGHTS

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Introduction to Industry 4.0

Dr. Jesmond Hong
TUM Asia

This workshop provides an overview of the four Industrial Revolutions. Students will also understand the evolution of the manufacturing paradigms and the changing roles of customers. The nine pillars of Industry 4.0 will be briefly discussed. Students will also learn about the synergies and contradictions between Lean Management and Industry 4.0.



The Future of Urban Logistics

Prof. Oliver Kunze
TUM Asia

TUM Asia

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How will logistics in cities be carried out in the midterm future? To answer this question, an overview of different existing and emerging transport logistics operations is provided, and the pros and cons of these different operations are set out. Based on these findings, a partial qualitative systemic model is presented showing how these operations are influenced by global and logistics trends on the one hand and by delivery service requirements on the other hand. From this model, a vision of urban logistics in the year 2030 is presented and discussed.



How E-Commerce Works

Prof. Dr. Christian Kille
TUM Asia

Ever wondered what happens after the click in E-Commerce? The answer is logistics. This logistics lecture will explain the processes and the logic of logistics in E-Commerce and at the same time, provide an outlook on future trends.



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How Logistics is Changing the World

Prof. Peter Klaus
Universität Erlangen-Nürnberg

In this lecture, Prof. Klaus offers a series of examples and stories on major innovations from the field of logistics and supply chain management, which change the way of how global commerce works, how things are manufactured, distributed, and also recycled today.

Next, Prof. Klaus adds some discussion on the benefits, new burdens and risks which come with those innovations, and what that means for career opportunities to students.

Technologies Transforming Warehousing

Mr Eldhose Abraham

TUM Asia – FESTO Competence Centre for Digitalisation, Technology and Innovation (CDTI)



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This workshop provides an overview of the various technologies that transform today's warehousing challenges. Some of these challenges are Digital Identification - using RFID, Barcodes and QR codes to quickly identify goods, Industrial Networking, Automated Storage and Retrieval Systems (ASRS), Mobile Robotics (AGV), Pick by Light Systems, Augmented Reality and Warehouse Management Systems. We will also share some case studies and best practices.



Logistics 4.0 as an Enabler for Future Factories

Prof. Dr.-Ing. Johannes Fottner
TUM



In manufacturing companies, a clear paradigm shift has taken place in the last 10 years due to the possibilities of new technologies and the implementation of Industry 4.0 / Internet of Things. Automation and flexibility are no longer at odds with each other; in fact, technology has reached a new dimension of flexibility and adaptability. Autonomous systems in transport have become able not only to find their way, but also to make decentralised decisions to optimise the process and be more robust in case of disruptions.

Even in SMEs, these new technologies were introduced and helped to achieve better competitiveness. Does this mean that we will have “dark factories” in the future, with no human workers, only autonomous systems? No - we are on the way to “smart factories” where technologies help humans to be more efficient, effective and reliable.

The lecture presents technological approaches to achieve this goal and shows practically implemented examples.



Challenges for Industrial Supply Chains: Automation, Sustainability and Resilience

Dr. Hanns Zeltinger
TUM Asia

During Covid-19 pandemic, nearly all supply chains, especially global ones, have been confronted with heavy interruptions in supply, demand, production and access to employees. Ongoing digitisation will result eventually into full or at least partial automation of most business processes, making additional value for clearly structured and growing data volumes (big data) which enables business decisions by using Machine Learning and other AI and IT technologies. Climate change and greenhouse gas emissions force companies to a paradigm change, which will eventually lead to a modern way of doing business, also known as the circular economy. This allows us to reduce extensive use of resources such as commodities, water and air, among others.



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Modelling and Optimisation of Transportation Systems

Univ.-Prof. Dr. Constantinos Antoniou
TUM

Gain an overall perspective from Prof. Constantinos Antoniou about modelling and optimisation of Transportation Systems. Having authored more than 250 scientific publications, including more than 70 papers in international, peer-reviewed journals, 170 publications in international conference proceedings, a book and 15 book chapters, Prof. Antoniou's research focuses primarily on the modelling and simulation of transportation systems, intelligent transport systems (ITS), the calibration and optimisation of applications, and the application of behavioural economics in transport, road safety and sustainable transport systems.

High-Speed and Mass Transit Rail Technology

Dr. Bernhard Lechner
TUM



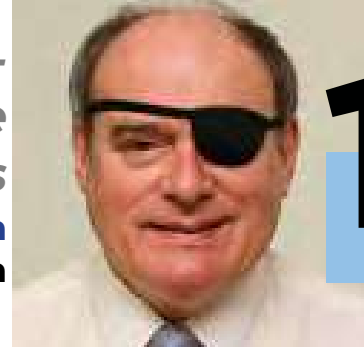
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In addition to the provision of safe and comfortable passenger journeys by controlling dynamic vehicle-track interactions, modern railway tracks have to meet numerous additional requirements. In order to limit the effects of noise and vibrations, to ensure compatibility with power supply and train control systems, and to integrate all interactions between the track and the substructure, specific design approaches are required. And finally, the rail infrastructure should be cheap and easy to maintain.



Redesigning Pick-Up-Drop-Off Points to accommodate Autonomous Vehicles

Dr. Graham Leedham
TUM Asia



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In this session we will look at:

1. The challenges AVs face in mixed traffic and particularly at PUDOs,
2. The simulation of present and future mixed traffic and pedestrians at PUDOs to better understand the possible scenarios AVs will encounter at PUDOs, and
3. The current design variability of PUDOs and our research into the future design and retrofitting of PUDOs to facilitate the introduction of AVs.

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Integrated Land Use/ Transport Modelling to Explore the Impact of More Radical Scenarios on Greenhouse Gas Emissions

Prof. Dr. Rolf Moeckel
TUM

In this lecture, Prof. Moeckel shares more of the integrated land use or transport modelling to explore the impact of more radical scenarios on greenhouse gas emissions. From 1996 to 2002, Dr. Moeckel studied Spatial Planning at the Technical University Dortmund and the University of Washington in Seattle. In 2006, he completed his doctorate at the Technical University Dortmund in land use modeling. In 2015, he joined TUM as a Rudolf Mößbauer Assistant Professor for Modeling Spatial Mobility. 2021, he was promoted to Associate Professor for travel behavior (tenured) at TUM.



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Dynamic Autonomous Road Transit (DART) System: A New Innovative Public Transport System

Dr. Andreas Rau
TUM Asia

Dynamic Autonomous Road Transit (DART) system developed by TUMCREATE in Singapore will be introduced. The vehicle concept is a new shared-mobility system encompassing flexible-and fixed-route services. It consists of a fleet of mixed-size modular electric, autonomous road-based vehicles, with high level secure communication between vehicle-to-vehicle and vehicle-to-intelligent infrastructure, to realise an efficient, attractive and comfortable mobility service.

Engineered Cementitious Composites for Electrified Roadway Application in Singapore

Dr. Ali Aryo Bawono
TUM Asia



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The electromobility concept has now started to become a trend to achieve the ultimate public transport system in megacities. Road infrastructure needs to be adapted and reinvented to support these positive trends. The concept of an electrified roadway with Dynamic Wireless Power Transfer technology can be a promising solution to charge electric vehicles (EVs) in megacities. Introduced as an innovative solution, an electrified roadway using a material called Engineered Cementitious Composites (ECC) has been proposed in Singapore. The high-performance fibre-reinforced cementitious composite exhibits an extreme tensile strain capacity much higher than normal concrete. These enable a slab pavement design without the usage of the steel reinforcement hinges. Thus, the interference of the electromagnetic field actuated by the inductive charging can be avoided as this may lead to a major reduction in charging rate efficiency.

TESTIMONIALS



Rongxuan Ye
China

“Though the classes were not directly related to my university major, I can safely say that they were some of the best classes I have ever attended.”



Vijay R
India

“The classes were so interesting that I did not doze off during any of the sessions.”



REGISTRATION DETAILS



1. Register via the sign-up form: <https://tum-asia.edu.sg/winter-school/> or scan QR code:



2. Complete your payment by following the instructions in the email that will be sent to you once you have completed your registration form.

3. Successfully enrol in Virtual Winter School 2022 - we are excited to have you join us!



Your registration will be completed and your place in the Virtual Winter School will be reserved when you have made the full payment of the Virtual Winter School Participant Fee of \$600* Singapore Dollars.

*This Fee is applicable to one participant per Fee, and the Fee is only inclusive of the virtual activity costs during the stipulated dates of the Virtual Winter School.

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