

Master of Science

Rail, Transport and Logistics



At A Glance

DEGREE BY
Technical University of Munich (TUM)

**TWO-YEAR
FULL TIME PROGRAMME**
Coursework in Singapore

PRACTICAL KNOWLEDGE
Compulsory Internship & Thesis

GLOBAL PROSPECTS
Internationally Recognized Degree

3 SPECIALISATIONS
Logistics, Railway, Transport

INTAKE
August Every Year

TO APPLY
Apply online from 15th October at
www.tum-asia.edu.sg

1 TUM is ranked as the #1 University in Germany⁺

8 TUM ranked #8 in the Global Employability Survey[^]

17 scientists and alumni of TUM have received the Nobel Prize

50 TUM is ranked among the world's Top 50 Universities[#]





TUM Asia

TUM Asia was set up in 2002 as the first academic venture abroad by a German university. The first joint-degree between TUM and the National University of Singapore (NUS) was established in 2002, with several joint programmes with Nanyang Technological University (NTU) added in the following years.

The specialized Master programmes aims to be in pace with industry trends and needs, while constantly challenging the worldview of students with an Asian-European curriculum. Lecturers and professors come from as far as Germany and their wealth of knowledge from various fields provide a spectrum of experience for the students to glean from. Towards the end of the programme, students complete their Master thesis and internship in any country in the world.

By 2017, more than a thousand students have come through the doors of TUM Asia and now ply their trades in top research institutes and companies across the globe.

Technical University of Munich (TUM)

The Technical University of Munich (TUM) is one of Europe's leading research universities, with around 550 professors, 41,000 students, and 10,000 academic and non-academic staff. Its focus areas are the engineering sciences, natural sciences, life sciences and medicine, combined with economic and social sciences.

TUM acts as an entrepreneurial university that promotes talents and creates value for society. In that it profits from having strong partners in science and industry. It is represented worldwide with the TUM Asia campus in Singapore as well as offices in Beijing, Brussels, Cairo, Mumbai, San Francisco, and São Paulo.

Nobel Prize winners and inventors such as Rudolf Diesel, Carl von Linde, and Rudolf Mößbauer have done research at TUM. In 2006 and 2012 it won recognition as a German "Excellence University." In international rankings, TUM regularly places among the best universities in Germany.



Master of Science

Rail, Transport and Logistics



TUM Asia's **Master of Science in Rail, Transport and Logistics** (MSc in RTL) will provide graduates with the necessary knowledge and skills to employ a diverse range of technologies that leverage on state-of-the-art railway, transport and logistics systems. One will learn to implement sophisticated and far-reaching solutions to transportation challenges that characterize modern economies.



MASTER DEGREE

Conferred by Technical University of Munich (Germany)



APPLICATION-FOCUSED

Full-time research and application focused programme, inclusive of internship experience and Master Thesis writing



INDUSTRY RELEVANCE

Our professors are actively involved in research and cooperation projects with leading industrial companies, allowing them to base the curriculum around the latest technological trends and knowledge



GLOBAL OPPORTUNITIES

You are able to complete your Internship and Thesis in Singapore or anywhere in the world, to look for job opportunities globally

COURSE OUTLINE

3

Specialisations to choose from:
Logistics, Railway, Transport

45

Contact hours for every Core and Elective Module

Programme Timeline Overview



July

Arrival in Singapore



Year 1

- Core Modules
- Elective Modules*
- Non-Technical Elective Modules



Year 2

- Elective Modules*
- Internship
- Master Thesis at a company, university or research institute
(Supervised by a TUM professor)



Graduation

End of Programme

* Students are able to choose from three specializations: Logistics, Railway or Transport.

Note: This outline is a general reference to the duration of study. A student's actual duration of study may or may not follow this general reference. This outline is subject to change during the course timetable.



Compulsory Modules

Students are required to complete the following list of compulsory module before selecting their specialisation:

Core Modules

- Decision Support for Logistics Management
- Public Transport Planning
- Soft Skills
- Statistical Methods for Transport and Logistic Processes
- Traffic Impacts, Evaluation of Transport and Logistic Processes
- Transport and Urban Planning

Specialisation Modules

Students are required to choose ONE of the following specialisations:

LOGISTICS

Core Modules

- Introduction to Business Logistics
- Introduction to Supply Chain Management

Elective Modules*

(Choose a minimum of 7 modules from the list below)

- Airport and Harbour Design
- Basics of Traffic Flow and Traffic Control
- Consumer Industry Supply Chain Management
- Design and Application of Material Handling Systems
- Green Supply Chain and Risk Management
- Health Care Logistics
- Highway Design
- Industrial Logistics
- Logistics Service Provider (LSP) Management
- Transportation Modelling and Simulation Tools

RAILWAY

Core Modules

- Rail Transport and Rail Planning
- Rolling Stock
- Trackworks
- Train Control and Signalling Systems

Elective Modules*

(Choose a minimum of 5 modules from the list below)

- Airport and Harbour Design
- Ballastless Track Systems
- Basics of Traffic Flow and Traffic Control
- Highway Design
- Industrial Logistics
- Introduction to Power Systems
- Modelling of Rail Infrastructure using CAD-FEM-MBS
- Traffic Operation and Control ITS
- Transportation Modelling and Simulation tools
- Tunnel Works and Geotechniques

TRANSPORT

Core Modules

- Basics of Traffic Flow and Traffic Control
- Highway Design
- Transportation Modelling and Simulation Tools

Elective Modules*

(Choose a minimum of 6 modules from the list below)

- Airport and Harbour Design
- Industrial Logistics
- Introduction to Business Logistics
- Introduction to Supply Chain Management
- Rail Transport and Rail Planning
- Trackworks
- Traffic Operation and Control (ITS)
- Urban Road Design

Non-Technical Elective Modules

Choose 1 from the list below:

- Business Administration
- Industrial Marketing
- Innovation and Technology Management
- International Intellectual Property Law
- Legal and Safety Aspects in Industry
- Modern Developments in the Industry
- Production Planning in Industry

For module synopsis, please refer to the additional handout, or visit www.tum-asia.edu.sg/admissions/programme-brochures

*Disclaimer: Specialisation modules available for selection are subject to availability. Unforeseen circumstances that affect the availability of the module include an insufficient number of students taking up the module and/or the unavailability of the professor. TUM Asia reserves the right to cancel or postpone the module under such circumstances.

Module Synopsis

Airport and Harbour Design

This module gives an insight into the necessary components of airports and harbours, and the planning processes for developing these sites.

Ballastless Track Systems

This module provides an introduction to ballastless track system's design, requirements and procedures, the special features of Metro and Light Rail systems, and train track interactions.

Basics of Traffic Flow and Traffic Control

The main topics covered are: traffic stream models, car following and continuum theory for road segments, queuing theory for signalised and unsignalised intersections.

Consumer Industry Supply Chain Management

This module addresses the issues of logistics and supply chain management from the perspective of national and international consumer goods producers, wholesalers, retail chains and direct marketers.

Design and Application of Material Handling Systems

This module introduces to the students the applications of material handling systems in several business areas, for instance logistics processes in transport modes like Air traffic, harbour logistics, warehouse and distribution.

Decision Support for Logistics Management

Students will learn principles of management decision support and an overview on relevant operations research tools and algorithms.

Green Supply Chain and Risk Management

Students are able to understand the business model of Green Supply Chains and are able to implement green techniques for company short and long term.

Health Care Logistics

This module covers the special aspects of logistics and supply chain management in the health care industry.

Highway Design

The module covers the planning and design of safe, high efficient and sustainable road infrastructure linking cities, which needs the knowledge of the dynamic behaviour of the vehicles.

Industrial Logistics

The module covers the issues of logistics and supply chain management from the perspective of global industrial producers and suppliers, such as from the electronics, electrical appliances, automotive and machinery industries.

Introduction to Business Logistics

In-depth knowledge about Evolution of Business Logistics, key definitions, megatrends for the future of Logistics will be taught here.

Introduction to Supply Chain Management

Students are able to interpret and apply SCM for fully automated processes; transport systems; airport, harbour, courier and express logistics.

Introduction to Power Systems

This module introduces students to the concepts and structure of power system: generation, transportation, distribution, electricity consumption, typical power plant types such as new renewable technologies, and description of the transport.

Logistics Service Provider (LSP) Management

This module focuses on the "life cycle" issues of logistics service provider. Management such as market selection and analysis, as well as transport mode choices will be taught here.

Modelling of Rail Infrastructure using CAD-FEM-MBS

This module gives an introduction to tools and methods of planning railway infrastructure using Computer Aided Design (CAD) software, by applying the requirements and rules set for railway planning using Finite Element Method (FEM) and Multi-body simulation (MBS).

Public Transport Planning

Students will learn to plan and operate different public transport modes and public transport scheduling.

Rail Transport and Rail Planning

The module covers freight and passenger rail-transport systems. focusing on infrastructure planning and train-track interactions.

Rolling Stock

This module covers the wheel-rail interaction, running behaviour in curves and straight track, propulsion systems diesel, electricity AC and DC.

Statistical Methods for Transport and Logistic Processes

Students will learn to apply the most common methods in statistics used to analyse data in practical applications.

Trackworks

This module provides an understanding of the forces acting between vehicle and track, and the load distribution within the track superstructure into the substructure.

Traffic Impacts, Evaluation of Transport and Logistic Processes

This module introduces the basic principles and concepts of an assessment and evaluation of transport and logistic systems.

Traffic Operation and Control (ITS)

The module provides insights into the state-of-the-art control measures for optimising traffic flows. The main topics are: the principles of urban, extra-urban and integrated systems.

Train Control and Signalling Systems

This module introduces to the students the train control and signalling systems. Turnout, signals, and all track based equipment, facilities, electronic interlocking and train control systems will be covered too.

Transport and Urban Planning

This module provides basic knowledge about travel demand, modelling and relationships between transport and urban planning.

Transportation Modelling and Simulation Tools

The module provides detailed knowledge about software tools for traffic and system simulation. Microscopic and macroscopic simulation will be dealt with in this lecture.

Tunnel Works and Geotechniques

This module covers the basics of geotechnical engineering, geosynthetics, ground investigation, tunnelling and its load bearing effects, and shield tunnelling.

Urban Road Design

Provides in-depth knowledge on planning, designing and organizing urban streets as spaces for living, furthermore looking at different ways to organise transportation.



ADMISSION CRITERIA*

- You may apply to our programme if you have completed your Bachelor Degree Programme, or if you are in your final year of Bachelor Degree studies
- Hold or enrolled in a Bachelor Degree (completed in at least three years, depending on factors such as the rest of your education background) in any of the following fields: **Civil Engineering, Computer Science, Electrical Engineering, Mathematics, Mechanical Engineering, Transport Engineering** (list is not exhaustive)
- Submit one **(1) notarised copy of Bachelor Degree Certificate or Enrolment Letter**** (if you have not completed your Bachelor Degree) and one **(1) notarised copy of Academic Transcripts or Mark Sheets****
- Submit **two (2) Recommendation Letters** from two (2) different Professors or Employers
- Submit **one (1) Statement of Purpose** that indicates the reason(s) you are interested in the programme you applied for
- Submit **one (1) Curriculum Vitae / Resume**
- Submit **TOEFL / IELTS test score** taken no more than two years ago from date of submission of online application
- Submit **Akademische Prüfstelle (APS)** certificate (Required for applicants who hold a degree from China, Vietnam, or Mongolia)

TOEFL test score requirements: At least 88 for the Internet-Based Test (TOEFL code: 7368)

IELTS test score requirements: Overall IELTS results of at least 6.5

* The full application process is available on www.tum-asia.edu.sg/application-process.

** Documents which are not in English must be translated by a certified translator. All applicants are also required to submit an additional of two (2) notarised copies of Official or Provisional Bachelor Degree Certificate, two (2) notarised copies of full, Official Academic Transcript, and two (2) passport-sized photographs when you have accepted the offer of admissions and are being matriculated into our programme.

TO APPLY

Applications open 15 October every year. Apply online at www.tum-asia.edu.sg

FEES

APPLICATION FEE

SGD 79 is payable for each application per programme

TUITION FEE

A Total of EUR 19,000⁺

- The tuition fee will be divided into 3 instalments for payment
- The tuition fee includes teaching fees, laboratory expenses and cost of mandatory events.
- The tuition fee does not include airfare, accommodation, living expenses, and miscellaneous fees (inclusive of registration, IT facilities, matriculation, examination, amenities, copy right, sports, insurance and medical). These fees will be separately paid by the student.

⁺ The tuition fee stated is accurate as of 1 August 2018. All fees are subject to revision due to currency fluctuations, at the discretion of TUM Asia. All fees quoted are inclusive of 7% Singapore's Government Goods & Services Tax. Please refer to our website for fee updates.





Studying With Us

“Talents Are Our Assets, Reputation Is Our Return”

Entrepreneurial Thinking and Engagement

Globalization is now an inevitable force that is here to stay. At TUM Asia, our classroom reflects this diversity with an enrolment of over 28 nationalities. This means that we foster a vibrant learning environment where the student learns not only from the textbook but also through the lives of their counterparts. Classroom ideas are synthesized across the diverse economic realities and students learn to see from multiple vantage points, creating a capacity to solve problems in creative ways. The unique degree programme not only equips the student with technical and scientific knowledge, but with an enriched curriculum consisting of business and cultural modules.

TUMCREATE

TUM is known for its research capabilities and strength in innovation. As such, TUM Asia spearheaded the set up of TUMCREATE as a base of research in Singapore. TUMCREATE is a joint programme between Technical University of Munich (TUM) and Nanyang Technological University (NTU). The electromobility institute brings together the expertise and innovation of Germany and Singapore, to drive innovation to shape the future of sustainable mobility by tackling issues ranging from the molecules to the megacity. **Graduates from the TUM Asia Master programmes have the opportunity to apply for positions at TUMCREATE, especially if your interest lies in the area of transportation and mobility research.**

Highest International Standards

You will be studying with the world's best professors from TUM, as well as experts from the industry. Not only will the student benefit from professors who are actively involved in research, one will also receive a holistic learning experience with the engagement of local lecturers from academia and industry. Majority of our modules are covered by professors who fly in from Germany on an exclusive teaching basis, to ensure that students get the undivided attention of their lecturers.

TUM Asia's Rail, Transport and Logistics programme, with its multi-cultural atmosphere, prepares students for international careers in the wide field of transport and logistics. Focusing on strategies, topic-interactions and creativity, the students are able to develop skills to successfully lead multi-disciplinary projects.

Dr. Bernhard Lechner

Senior Researcher & Lecturer, Technical University of Munich
Collaborating Scientist at TUMCREATE

DO YOU KNOW THAT SINGAPORE HAS A VIBRANT ECOSYSTEM OF MAJOR LOGISTICS COMPANIES, AND ENJOYS A STABLE CITY ENVIRONMENT FOR COMPANIES TO TEST AND DEVELOP SMART MOBILITY TECHNOLOGIES?



Heart of Southeast Asia: Singapore's Strategic Location

Singapore's strategic position on the crossroads of the world and at the nexus of major shipping lanes has earned it the reputation of being an important logistics hub and conduit for world trade. Singapore is well-positioned to help logistics companies build on their manufacturing leadership and develop higher value adding services. With further growth attributed to Asia's early advantage of low-cost competition and frugal engineering using minimum resources, Singapore's demand for an efficiently structured transportation and logistics system will only continue to grow.

The Rail, Transport and Logistics Industry in Singapore

Singapore is the leading Transportation & Logistics hub in the world. Singapore's global connectivity and its secure and business-friendly import/export procedures provides companies greater efficiencies in conducting business. Singapore provides world class infrastructure to help support the growth of the logistics industry, for instance, the Airport Logistics Park of Singapore (ALPS) in the airport's free-trade zone. The Railway Industry in Singapore is undergoing a steady growth with plans outlined to increase manpower leading to extension of the current MRT network.

Our Graduates



Our graduates in Rail, Transport & Logistics are employed all over the world, such as in **Singapore and Europe**.



The most commonly accepted positions are Air Freight Analyst, Logistics Analyst, Transport Analyst, and Import & Export Coordinator.



Our graduates have found job opportunities with **DHL, Rhenus Logistics, Medtronic**.

7 The World Bank ranked Singapore as the #7 Logistics Hub amongst 155 countries globally in the 2018 Logistics Performance Index

2 Singapore's Changi Airport is one of Asia's largest cargo airports and handles close to 2 million tonnes of cargo annually

7 Singapore's location is also proximate to the world's major markets as it is situated within a 7-hour flight radius to half the world's population in Asia Pacific

20 Singapore is a prime location for major logistics firms, with 20 of the top 25 global logistics players conducting operations in Singapore

120 Singapore is one of the world's busiest transshipment hub, handling about 1 out of 7 of the world's container transshipments; more than 120 million TEUs of containers in 2018

600 Singapore is linked to more than 600 ports across 120 countries worldwide with more than 130,000 ships call annually

TUM Asia, combining the tradition in education and the dynamics of one of the most important hubs in Asia, does provide students with the skills and exposure needed for the successful realization of their dreams and ambitions!

Kalin Stoyanov

Alumnus, Master of Science in Rail, Transport and Logistics Planning and Control, Rolls-Royce

Ambitious, motivated, open-minded & hardworking - this is how the TUM Asia graduates are excellently contributing to live up to Pan Asia Logistics' core values: Knowledge driven, Integrity, Personal Relationship and Service Excellence.

Pan Asia Logistics Singapore Pte Ltd

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All information is accurate at the time of printing and is subject to change without prior notice.
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⁺ As rated by Academic Ranking of World Universities (Shanghai Ranking) 2011-2013, 2016 and 2015-2018 QS World University Ranking

[^] As ranked by the Global University Employability Ranking 2017

[#] As ranked by Academic Ranking of World Universities (Shanghai Ranking) 2013, 2017/2018 and 2013/2014 QS World University Ranking