Technical University of Munich

Undergraduate Programmes

Bachelor of Science in Chemical Engineering
Bachelor of Science in Electrical Engineering & Information Technology
The Technical University of Munich (TUM) was founded in 1868 and is one of Europe’s leading technical universities. Ever since its founding, TUM has been at the forefront of science and innovation, playing a vital role in Europe’s technological advancement. 17 TUM professors and alumni have been awarded the Nobel Prize since 1927, most notably Ernst Otto Fischer (Chemistry) and Rudolf Mößbauer (Physics). In international rankings, TUM is regularly placed among the best universities in Germany.

TUM Asia was set up in 2002 as the first academic venture abroad by a German university. Offering Bachelor, Master courses and a series of executive education courses, TUM Asia strives to be on the front edge of change by constantly scanning the industry landscapes in Asia, refining its approach on education to remain relevant to the industry. 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.
TUM has been ranked as the #1 University in Germany in the last few years and is known to promote an entrepreneurial mindset among students.

As rated by QS World Ranking 2015 - 2018 and Academic Ranking of World Universities (Shanghai Ranking) 2011-2013, 2016

German Engineering is known to represent some of the highest standards of quality worldwide. A German degree is prepared to equip students with industry-relevant skills and knowledge.

The Bachelor programmes in Germany are conducted in the German language. As a TUM campus, students will enjoy a similar academic structure, but with the classes conducted in English.
This system allows you to focus on one subject at a time, rather than a spectrum of subjects throughout the semester.

**PROFESSORS**

TUM professors have years of experience in their respective industries. Posing questions for students to solve based on industry knowledge, this prepares students to enter the workforce with knowledge that can be applied.

**SMALL CLASS SIZE**

Instead of sitting in a lecture hall with hundreds of students, our classes are limited in size to ensure a better learning experience. Students will get to interact with their lecturers on a personal level and can easily clarify their doubts.
BACHELOR OF SCIENCE PROGRAMMES

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Bachelor of Science in
CHEMICAL ENGINEERING

At A Glance

✅ GERMAN DEGREE
Conferring by Technical University of Munich (Germany) in 2.5 to 3 years

✅ ASIAN RELEVANCE
German engineering excellence combined with modules tailored to suit the Asian industry

✅ 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

✅ OVERSEAS IMMERSION PROGRAMME
You are able to complete your Bachelor Thesis in Munich at TUM spending 3 to 5 months there

About The Programme

This Chemical Engineering degree programme is largely focused on industrial chemistry, dealing with upstream processes of Chemical Engineering. Students will be exposed to the development and design of chemical processes through laboratory experiments and analysis. A strong focus is placed on the fundamentals of inorganic and organic chemistry to provide noble solutions to the petrochemical, pharmaceutical and environmental industries.

1. The Faculty of Chemistry at TUM is ranked first in Germany*
9. Scientists and alumni of TUM have received the Nobel Prize in this faculty
13. Placed 13th worldwide in Chemistry*

*As ranked by Academic Ranking of World Universities 2012/2013
Course Outline

**Year 1**
- Advanced Mathematics 1, 2 & 3
- Physics
- Engineering Thermodynamics
- CAD and Technical Drawing
- General & Inorganic Chemistry
- Information Technology 1
- Analytical Chemistry*
- Advanced Inorganic Chemistry*
- Chemical Thermodynamics

**Year 2**
- Engineering Mechanics 1 & 2
- Materials Science & Engineering
- Chemical Engineering Principles
- Chemical Engineering Design Course
- Basic Quantum Mechanics & Spectroscopy
- Chemical Reaction Engineering and Catalysis
- Organic Chemistry 1 & 2*
- Information Technology 2
- Thermal Process Engineering
- Heat Transfer Phenomena
- Biochemical Process Engineering
- Mechanical Process Engineering

**Final Year (1 Semester)**
- Chemical Engineering 1* & 2*
- Fluid Mechanics
- Chemical Thermodynamics*
- Bachelor Thesis (Conducted at TUM, Germany)

*Lab Coursework will be required in these modules

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**Undergraduate Degree Overview**

180 credits

- **Foundation Modules** (82 credits): Mathematics (17 credits) + Basic Natural Sciences & Mechanics (20 credits) + Chemistry (45 credits)

- **Advanced Modules** (84 credits): Core Modules (72 credits) + Bachelor Thesis (12 credits)

- **Professional Qualifications** (14 credits): Internship (8 credits) + Cross Discipline (6 credits)

- **Exemption Package for Articulated Diplomas** (18 credits): Biology (4 credits) + Internship (8 credits) + Cross Discipline (6 credits)

**DURATION**

2.5 years (5 semesters)

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**Articulated Diplomas**

The graduates of the following Polytechnic Diploma Programmes are eligible to apply for an exemption package up to 18 credits.

- **Nanyang Polytechnic**
  - Diploma in Biologics & Process Technology
  - Biomedical Engineering
  - Chemical & Green Technology
  - Food Science & Nutrition
  - Medicinal Chemistry
  - Molecular Biotechnology
  - Nanotechnology & Materials Science
  - Pharmaceutical Sciences

- **Ngee Ann Polytechnic**
  - Diploma in Biomedical Engineering
  - Biomedical Science
  - Chemical Engineering
  - Chemical and Biomolecular Engineering
  - Environmental & Water Technology
  - Molecular Biotechnology
  - Pharmaceutical Sciences

- **Republic Polytechnic**
  - Diploma in Biomedical Sciences
  - Biotechnology
  - Environmental Science
  - Materials Science
  - Pharmaceutical Sciences

- **Singapore Polytechnic**
  - Diploma in Applied Chemistry with Materials Science
  - Applied Chemistry with Pharmaceutical Science
  - Biomedical Science
  - Biotechnology
  - Chemical Engineering
  - Chemical Process Technology
  - Food Science & Technology
  - Materials Science
  - Perfumery & Cosmetic Science
  - Process Engineering

- **Temasek Polytechnic**
  - Diploma in Applied Food Science & Nutrition
  - Biomedical Engineering
  - Biomedical Science
  - Biotechnology
  - Chemical Engineering
  - Pharmaceutical Science

*Other relevant diplomas not listed will be considered on a case-by-case basis.

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"World-class chemistry & German engineering from Germany’s top university will give the students a bright future for prospective jobs not only in Singapore, but also around the world."

Prof. Kai-Olaf Hinrichsen
Dean, Chemistry Department, Head of Chair of Chemical Engineering (TUM) / Teaching Professor at TUM Asia
Course Outline

**Year 1**
- Advanced Mathematics 1, 2 & 3
- Biology
- Physics
- Engineering Thermodynamics
- CAD and Technical Drawing
- General & Inorganic Chemistry
- Information Technology 1
- Analytical Chemistry*
- Advanced Inorganic Chemistry*
- Chemical Thermodynamics

**Year 2**
- Engineering Mechanics 1 & 2
- Materials Science & Engineering
- Chemical Engineering Principles
- Chemical Engineering Design Course
- Basic Quantum Mechanics & Spectroscopy
- Chemical Reaction Engineering and Catalysis
- Organic Chemistry 1 & 2*
- Information Technology 2
- Thermal Process Engineering
- Heat Transfer Phenomena
- Biochemical Process Engineering
- Mechanical Process Engineering

**Final Year (1 Semester)**
- Chemical Engineering 1* & 2*
- Fluid Mechanics
- Materials Science & Engineering
- Chemical Thermodynamics*
- Cross Discipline
- Bachelor Thesis (Conducted at TUM, Germany)
- Industrial Internship

*Lab Coursework will be required in these modules

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**Undergraduate Degree Overview**
**(180 credits)**

Foundation Modules (82 credits): Mathematics (17 credits) + Basic Natural Sciences & Mechanics (20 credits) + Chemistry (45 credits)

Advanced Modules (84 credits): Core Modules (72 credits) + Bachelor Thesis (12 credits)

Professional Qualifications (14 credits): Internship (8 credits) + Cross Discipline (6 credits)

**Duration**
3 years (6 semesters)
Chemical engineering and process engineering involve the conversion of basic raw materials into a wide variety of useful products such as fuels, cosmetics, dyes, foods and medical preparations. In addition to improving existing processes, students will also learn to develop new process engineering applications in response to changes in safety and environmental protection requirements.

INDUSTRY PROSPECTS
Graduates can look forward to careers in these areas (but are not limited to): Petrochemical Industry, Fine and Speciality Chemicals, Commodity Chemicals, Pharmaceutical Industry and Wastewater Management.

JOB OPPORTUNITIES
The most commonly accepted positions are Chemical and Research Engineer, Process Engineer, Production Engineer, Quality Engineer, and Research Associate.

FURTHER STUDIES
Graduates are able to pursue a Masters at TUM, TUM Asia or any university of their choice around the world (subject to entry requirements of the course), and eventually a doctoral degree (PhD).

DID YOU KNOW?
Singapore is the 7th largest exporter of chemicals in 2015. Singapore’s chemicals and energy industry also ranks among the top 10 globally.

Source: www.edb.gov.sg

Education at TUM encompasses current knowledge of applied sciences with strong ties to industrial application. Our teaching focuses on the most important topics of today’s chemical research while supporting creative and independent thinking.

Prof. Dr. Stephan A. Sieber
Chair of Organic Chemistry II (TUM) / Teaching Professor at TUM Asia
Bachelor of Science in
ELECTRICAL ENGINEERING & INFORMATION TECHNOLOGY

Degree At A Glance

☑ GERMAN DEGREE
Conferred by Technische Universität München (Germany) in 2.5 to 3 years

☑ ASIAN RELEVANCE
German engineering excellence combined with modules tailored to suit the Asian industry

☑ 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

☑ OVERSEAS IMMERSION PROGRAMME
You are able to complete your Bachelor Thesis in Munich at TUM spending 3 months there

About The Programme

The Electrical Engineering & Information Technology Programme delivers competencies based on the five pillars of Electrical Engineering & Information Technology (Mathematics, Physics, Electrical Engineering, Information Technology and Signals & Systems), together with specialisations in Systems & Sensors and Integrated Circuit Design.

1  TUM is ranked first in Germany for Engineering & Technology*

4  Fourth-best among all Technical Universities in Europe*

17 Placed 17th worldwide in Engineering**

*As ranked by Academic Ranking of World Universities 2012/2013 and 2013/2014  **As ranked by QS World Rankings 2013/2014
For Articulated Diplomas

PROGRAMME STRUCTURE

Course Outline

Year 1
- Calculus 1 & 2
- Linear Algebra
- Circuit Theory 1 & 2
- Digital Technology
- Algorithms and Data Structures
- Computer Technology
- Physics
- Electricity & Magnetism

Year 2 & Year 3
- Calculus 3
- Discrete/Numerical Mathematics (Choose either)
- Measurement & Sensor Technology
- Electrical Energy Technology
- Electronic Devices
- Signal Representation
- Stochastic Signals
- Communication Engineering
- Control Engineering 1
- Electromagnetic Field Theory
- Materials for Electrical Engineering
- Electives
- Bachelor Thesis (Conducted at TUM, Germany)

*Lab Coursework will be required in these modules

Electives

Integrated Circuit Design
- Cryptology & IT-Security Systems
- Signal Processing Systems
- Lab Course Analog Circuit Design
- Lab Course Digital Circuit Design

Systems & Sensors
- Micro System Technologies (MEMS Components)
- Real-Time and Embedded Systems
- Dynamic Systems & Control 2
- Control & Automation Laboratory

Undergraduate Degree Requirements
(180 credits)

Foundation Modules (120 credits):

Advanced Modules (42 credits):
- Electives (30) + Bachelor Thesis (12)

Professional Qualifications (18 credits):
- Internship (12 credits) + Cross Discipline (6 credits)

Exemption Package for Articulated Diplomas (18 credits):
- Internship (12 credits) + Cross Discipline (6 credits)

DURATION
2.5 years (5 semesters)

Articulated Diplomas

The graduates of the following Polytechnic Diploma Programmes are eligible to apply for an exemption package up to 18 credits.

**Nanyang Polytechnic**
- Diploma in Biomedical Engineering / Electrical Engineering with Eco-Design / Electronics, Computer & Communications Engineering / Engineering Informatics / Information Technology / Cyber Security & Forensics (formerly known as Information Security) / Mechatronics Engineering / Multimedia & Infocomm Technology / Nanotechnology & Materials Science / Telematics & Media Technology

**Ngee Ann Polytechnic**

**Republic Polytechnic**
- Diploma in Aerospace Avionics / Aerospace Engineering / Biomedical Electronics (formerly known as Biomedical Electronics Engineering) / Communications & Automation Electronics / Digital Entertainment Electronics / Electrical & Electronic Engineering / Information Technology / Micro & Nanotechnology / Electronics Engineering / Green Building Energy Management / Information Technology / Mobile Software Development

**Singapore Polytechnic**

**Temasek Polytechnic**

*Other relevant diplomas not listed will be considered on a case-by-case basis.
For Non-Articulated Diplomas, GCE ‘A’ Levels Graduates, International Baccalaureate & International Students

PROGRAMME STRUCTURE

Course Outline

Year 1
• Calculus 1 & 2
• Linear Algebra
• Circuit Theory 1 & 2
• Digital Technology
• Algorithms and Data Structures
• Computer Technology
• Physics
• Electricity & Magnetism

Year 2 & Year 3
• Calculus 3
• Discrete/Numerical Mathematics (Choose either)
• Measurement & Sensor Technology
• Electrical Energy Technology
• Electronic Devices
• Signal Representation
• Stochastic Signals
• Communication Engineering
• Control Engineering 1
• Electromagnetic Field Theory
• Materials for Electrical Engineering
• Electives
• Cross Discipline Modules
• Bachelor Thesis (Conducted at TUM, Germany)
• Industrial Internship (Minimum of 8 weeks)

*Lab Coursework will be required in these modules

Electives

Integrated Circuit Design
• Cryptology & IT-Security
• Signal Processing Systems
• Lab Course Analog Circuit Design
• Lab Course Digital Circuit Design

Systems & Sensors
• Micro System Technologies (MEMS Components)
• Real-Time and Embedded Systems
• Dynamic Systems & Control 2
• Control & Automation Laboratory

Undergraduate Degree Requirements (180 credits)


Advanced Modules (42 credits): Electives (30) + Bachelor Thesis (12)

Professional Qualifications (18 credits): Internship (12 credits) + Cross Discipline (6 credits)

DURATION
3 years (6 semesters)
Electrical Engineering & Information Technology forms the foundation of the digital age and are among the prime engines of technological and economic progress. Students are offered a head start on the challenges of the future in areas as diverse as automotive technology, power engineering and electronics engineering, with applications ranging from green energy to electronics, medical technology, space satellites and household appliances.

INDUSTRY PROSPECTS
Graduates can look forward to careers in these areas (but are not limited to): Automotive Industries, Electronics Industries, Information Technology, Manufacturing Industries, Power Industries, Telecommunications, Transport Industries, and Utilities Companies.

JOB OPPORTUNITIES
The most commonly accepted positions are Communication Engineer, Control & Automation Engineer, Electronics Engineer, Enterprise Architect and Project Consultant / Manager.

FURTHER STUDIES
Graduates are able to pursue a Masters at TUM, TUM Asia or any university of their choice around the world (subject to entry requirements of the course), and eventually a doctoral degree (PhD).

DID YOU KNOW?
Electronics is a major industry underpinning Singapore’s economic growth and contributes 31.6% of the total manufacturing output.
Source: www.edb.gov.sg

Our experience with TUM graduates has been positive so far. The graduates come in with a good foundation and confidence to adapt quickly to their new job. TUM graduates are a good source of Engineering talent comparable with graduates from the top universities in Singapore.
Rohde & Schwarz Asia Pte Ltd
As part of TUM Asia’s undergraduate degree requirements, every student will complete his/her Bachelor Thesis in the home campus of TUM after successfully completing his/her coursework. Each student will have the opportunity to spend three to six months living and studying in Munich, as part of the Overseas Immersion Programme (OIP) experience.
This experience is designed not only for the benefit of the student's academic learning, but also for the development of lifeskills. Living abroad & caring for oneself's needs will enable every student to pick up soft skills that will never be learnt in the classroom. Students will also pick up basic German for day-to-day living & learn the tact of assimilating into another culture - a key skill in today’s globalized workforce.

The city of Munich, is home to two of the most elite universities in Europe. Munich attracts a strong number of international students each year as the city is safe and easily accessible by public transport (the trains run till 3am!). Munich is centrally located to the neighbouring countries such as Switzerland, Austria, France and Italy, which makes short leisure trips possible on weekends. Our professors have also commented that Singapore can be extremely similar to Munich - apart from the weather! Turn the page to find out more about what Munich has to offer you.
Munich’s most famous soccer team, FC Bayern München, is also the most successful club in German soccer history.

The Allianz Arena is also located in Munich and is widely known as the first stadium in the world with a full color-changing color exterior. Students will get the opportunity to watch famous stars play some of the top teams in the world.

Munich is home to the annual Oktoberfest, a world-renowned beer festival which occurs for two weeks at the end of September. This coincides with the time that students fly over for their Overseas Immersion Programme.

Entrepreneurship is highly respected in Munich. Start-up weekends are regularly held to allow individuals to develop innovative ideas with the help of professionals. TUM promotes the same entrepreneurial spirit, and students are able to be immersed in this culture during their stay in Munich.

Munich, or München, is the third largest city after Berlin and Hamburg, with a population of approximately 1.4 million people.
Munich is a student-friendly city and is ranked within the top ten cities for students. Munich also has a very efficient public transport system, making it easy to travel around.

Reputable global companies such as BMW, Linde and Siemens are homegrown in Munich. Other well-known companies such as Rohde & Schwarz and TÜV SÜD have made Munich their company headquarters.

Munich is the location of the largest Science & Technology museum in the world. It displays more than 28,000 objects in 50 exhibition areas.

Munich is very international and it is easy to come across many Asian, Turkish eateries and supermarkets. The student suburb is an excellent place to find wallet friendly prices for students.

Munich is a student-friendly city and is ranked within the top ten cities for students. Munich also has a very efficient public transport system, making it easy to travel around.
TUM is strongly connected with significant industry partners who are supportive of the quality and rigour of our academic curriculum. We are able to secure internship and career opportunities not only in Singapore, but also around the world with our TUM degree. At TUM Asia, learning is not solely about understanding theoretical knowledge, but also knowing how to apply them. The hands-on experience during our thesis work in Germany and internship has certainly prepared me well for a head start in my career.

Lim Wei Ting  
Software Engineer  
Continental Automotive Singapore Pte Ltd  
BSc Electrical Engineering & I.T. (Best Thesis, Class of 2014)

The core modules, which are the building blocks of our lab sessions and thesis writing, have equipped me with relevant skills for my job such as handling equipment and safety protocols in labs. Good writing and communication skills are also important learning points that helped me deal with my supervisors and colleagues. The Overseas Immersion Program was the most memorable experience of my educational journey as most of the usable skills needed in the workforce can be learned through this program. It is an opportunity not to be missed!

Muhammad Ariff Horlis  
Encapsulation Junior Scientist  
Firmenich Singapore  
BSc Chemical Engineering (Class of 2016)
Our German professors always provide us with tough but relevant problems that relate to real-life applications, whether in industry or nature. The small class size in TUM Asia makes it easy for us to approach and interact with our German lecturers, making the entire learning experience a fruitful one.

Abdul Yasser Bin Abdul Karem  
Undergraduate, BSc Electrical Engineering & I.T.

The Overseas Immersion Programme allowed us to gain first-hand experience on state-of-the-art equipment and simulations in the laboratory. This has enhanced my understanding on various theories and concepts that I have learnt during classes.

Ang Shieh Ying  
Undergraduate, BSc Chemical Engineering

Studying in TUM Asia has broadened my perspectives on the quality and excellence of German engineering. The programme offers a unique learning style that emphasizes in-depth understanding and problem-solving. This allows us to build a strong theoretical foundation that is essential for tackling problems faced in the engineering industry.

Yu Feng  
Undergraduate, BSc Electrical Engineering & I.T.
ELECTROMOBILITY IN TROPICAL MEGACITIES

Known for its research capabilities and strength in innovation, TUM Asia spearheaded the set up of TUM CREATE as a base for research here in Singapore. TUM CREATE is a joint research programme between Technische Universität München (TUM) and Nanyang Technological University (NTU). It is part of the Campus for Research Excellence And Technological Enterprise (CREATE) programme funded by the National Research Foundation, an agency of the Prime Minister’s Office in Singapore.

Merely after two years of research and development, TUM CREATE unveiled the electric taxi prototype EVA that was designed and built from the ground up. It features the technologies and innovations developed by their scientists and engineers. In 2015, EVA, the world’s first electric taxi for tropical megacities was launched.

TOWARDS THE ULTIMATE TRANSPORT SYSTEM

In 2016, TUMCREATE embarked on Phase 2 of their research work, working towards building the Ultimate Transport System. The research aims to close the existing transport gap between Mass Rapid Transport (MRT) and Bus and increase comfort and efficiency for commuters.

Graduates from the TUM Asia undergraduate programmes have the opportunity to apply for positions at TUM CREATE, especially if your interest lies in research/mobility.

Over 100 scientists & engineers working in 10 research areas, including energy storage, EV design, computer modeling & simulation and transportation engineering

“...We combine German expertise from TUM with Singapore’s existing knowledge in our cutting edge research at TUM CREATE. Our goal is to develop knowledge, build capacity and contribute to the local R&D landscape.”

Professor Dr. Maria-Elisabeth MICHEL-BEYERLE
How To Apply

Admission is open every year from January to March.

Applications for our undergraduate programmes are facilitated by Singapore Institute of Technology (SIT). You may apply online via SingaporeTech.edu.sg. Kindly refer to SIT’s website for tuition fees and other relevant admission criteria.

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