Master of Science
Industrial Chemistry

JOINT DEGREE BY
Technical University of Munich (TUM)
National University of Singapore (NUS)

20 MONTHS FULL TIME PROGRAMME
Coursework in Singapore

PRACTICAL KNOWLEDGE
Compulsory Internship & Thesis

GLOBAL PROSPECTS
Internationally Recognized Degree

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 17 scientists & alumni of TUM have received the Nobel Prize
50 Both TUM & NUS* are in the world’s Top 50 Universities
Technical University of Munich (TUM)

Technical University of Munich (TUM) is one of Europe’s leading research universities, with around 524 professors, 10,100 academic and non-academic staff, and more than 40,000 students. Its focus areas are the engineering sciences, natural sciences, life sciences and medicine, reinforced by schools of management and education.

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 a campus in Singapore as well as offices in Beijing, Brussels, Cairo, Mumbai, and São Paulo.

Nobel Prize winners and inventors such as Rudolf Diesel and Carl von Linde 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.

TUM Asia

Through TUM’s unwavering commitment to the betterment of society, TUM Asia was set up in 2002 as the first academic venture abroad by a German university. Today, TUM Asia offers standalone and joint Bachelor and Master programmes in Singapore together with partner universities such as National University of Singapore (NUS), Nanyang Technological University (NTU) and Singapore Institute of Technology (SIT).

A close cooperation with key industry players helps to ensure that the curriculum stays relevant and practical to the needs of the industry. Together with the unique combination of German engineering with Asian relevance, TUM Asia’s graduates are equipped to enter both industry and research sectors on a global level. With over a decade of experience, TUM Asia continues to provide quality higher education programmes suited to the needs of the industry in Asia.

In 2015, over one thousand students have come through the doors of TUM Asia and currently ply their trades in top research institutes and companies across the globe.
Master of Science in Industrial Chemistry

TUM Asia's Master of Science in Industrial Chemistry (MSc in IC) aims to groom future leaders in selected areas of technology. It is an enriching postgraduate course for specialist engineers in the pharmaceutical, fine & speciality chemical industries.

**COURSE OUTLINE**

The student has to complete 12 modules and 4 lab courses in 3 semesters (4 Core Modules, 7 Elective Modules, 1 Business & Technical English Module)

Lab Courses
(Pre-essential Chemistry, 4 Core Modules and Research Practical Course)

Electives of your choice, with three specialisations:
1) Catalysis and Petrochemistry
2) Building and Material Science
3) General Combination

Contact hours for every Core, Elective Module and Lab Course

**Duration of the Programme: 20 months**

<table>
<thead>
<tr>
<th>August</th>
<th>5 Months</th>
<th>6 Months</th>
<th>3 Months</th>
<th>6 Months</th>
<th>Graduation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrival in Singapore</td>
<td>• Business &amp; Technical English</td>
<td>• Core Modules</td>
<td>• Research Practical Lab Course</td>
<td>Master Thesis at a company, university or research institute (Supervised by a NUS or TUM professor)</td>
<td>End of Programme</td>
</tr>
<tr>
<td></td>
<td>• Core Modules</td>
<td>• Elective Modules</td>
<td>• Internship</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Lab Modules</td>
<td>• Elective Modules</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Elective Modules</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**JOINT DEGREE**
Conferred by Technical University of Munich (Germany) and National University of Singapore (Singapore)

**4 SEMESTERS**
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 with a company, university or research institute and look for job opportunities globally

45

Contact hours for every Core, Elective Module and Lab Course

12

Lab Courses
(Pre-essential Chemistry, 4 Core Modules and Research Practical Course)

7

Electives of your choice, with three specialisations:
1) Catalysis and Petrochemistry
2) Building and Material Science
3) General Combination

45

Lab Courses
(Pre-essential Chemistry, 4 Core Modules and Research Practical Course)
Module Synopsis

Pre-essential modules
Business and Technical English
Chemistry Lab Course

Core Modules (*Comes With Practical)
Organometallic and Coordination Chemistry*
Inorganic and Material Chemistry*
Chemical Reaction Engineering*
Polymer and Macromolecular Chemistry*

Elective Modules*
(Choose one area of specialization)

Specialization 1: Catalysis and Petrochemistry
Molecular and Heterogeneous Catalysis
Petroleum and Petrochemical Processes
Unit Operations

Specialization 2: Building and Material Science
Building Chemistry and Construction Chemicals
Material Chemistry and Engineering
High-performance Polymers

Specialization 3: General Combination
One Module From Specialization 1
One Module From Specialization 2
One Module From Specialization 1, 2 or Elective Modules*

Additional Elective Modules*
Business Administration
Industrial Marketing
Production Planning in Industry
Legal and Safety Aspects in Industry
International Intellectual Property Law
Technology Transfer
Industry 4.0

A list of modules offered by the Department of Chemistry and the Department of Chemical & Biomolecular Engineering of NUS will be made available to the students before the start of the semester. The list of available modules is subject to change.

Research Practical Course**
Internship
Master’s Thesis

*Disclaimer: Elective 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.

**May be completed outside of course location for overseas exposure. Details to be advised during academic semester.
Admissions Information

ADMISSION CRITERIA*

• Hold a minimum 3-year Bachelor Degree in Chemical Engineering, Chemistry, or equivalent degree in other relevant disciplines
• Submit one (1) notarised copy of Official or Provisional Bachelor Degree Certificate** and one (1) notarised copy of Official or Provisional Academic Transcript***
• Submit two (2) Recommendation Letters from two (2) different Professors or Employers
• Submit one (1) Letter of Motivation that indicates the reason(s) you are interested in the programme you applied for
• Submit one (1) Curriculum Vitae / Resume
• Submit one (1) Passport-sized photograph** and one (1) Passport Biodata Page photocopy (the passport page with your personal particulars)
• TOEFL / IELTS (Required for applicants whose native tongue or medium of instruction from previous studies is not in English)
• Akademische Prüfstelle (APS) certificate (Required for applicants who hold a degree from China, Vietnam, or Mongolia)

Important: Documents that are not in English must be translated by a certified translator

*Find out about the full application process on www.tum-asia.edu.sg/application-process

**All applicants are required to submit an additional of three (3) notarised copies of Official or Provisional Bachelor Degree Certificate, three (3) notarised copies of full, Official Academic Transcript, and three (3) passport-sized photographs when you have accepted the offer of admissions and are being matriculated into our programme

TO APPLY

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

TUITION FEES

<table>
<thead>
<tr>
<th>APPLICATION FEE</th>
<th>PAYMENT OF TUITION FEES</th>
</tr>
</thead>
<tbody>
<tr>
<td>S$79 (inclusive of GST) is payable for each application per programme</td>
<td>A Total of SGD 48,150*</td>
</tr>
<tr>
<td></td>
<td>Tuition fees includes teaching fees, examination fees, internet access on campus, laboratory expenses and cost of mandatory events. Expenses excluded from this fee and are to be borne by students include: airfare, accommodation, and living expenses. The tuition fee will be paid in 3 installments.</td>
</tr>
</tbody>
</table>

*Tuition fees are accurate as of 1 November 2017. Tuition fees are subject to revision due to currency fluctuations, at the discretion of TUM Asia. Fees quoted are inclusive of 7% Singapore’s Government Goods & Services Tax. Please refer to www.tum-asia.edu.sg/MScfees for the latest tuition fees.
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 20 month joint degree equips the student with not only technical and scientific knowledge, but with an enriched curriculum composed of business and cultural modules.

The excellent academic education that tackled cutting edge topics in daily industrial business provided me with a sound understanding of how modern companies work. This unique combination equipped me with the right skills to drive value innovation in my projects.

Korwin Schelkle
Alumni, Master of Science in Industrial Chemistry
PhD Student, Spitzencluster Forum Organic Electronics

Highest International Standards
You will be studying with the world’s best professors from TUM and NUS, 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. Our TUM 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.

The Industrial Chemistry course provides compelling insight into important topics of modern applied chemistry. It helps students to gain knowledge and to improve their creativity, which is of utmost importance for the future development of both society and industry. It also provides a solid basis to build upon for leadership positions that take part in shaping our future.

Prof. Dr. Fritz E. Kühn
Professor at Technical University of Munich,
Head of Molecular Catalysis, TUM
DID YOU KNOW THAT THE CORE OF THE CHEMICAL INDUSTRY IS SHIFTING TO ASIA BY 2030?

Jurong Island: Singapore’s Dynamic Chemical Hub

Singapore’s position as a global chemicals hub has grown with the extensive development of Jurong Island - an integrated complex housing many of the world’s leading energy and chemical companies. Given Singapore’s strong track record for intellectual property rights protection, the nation is ideal for companies seeking to develop and commercialise proprietary technologies and first class manufacturing processes.

Singapore aims to be a model of sustainable development by taking the lead to address climate change concerns and global resource constraints. Solutions involve energy efficiency, emissions management, and sustainable feedstocks and technologies. A number of high impact projects to utilize Singapore’s integrated manufacturing location are being implemented.

The Chemical Industry in Asia

The current growth rate of Asia cannot be matched by any other region in the world. In the past two decades, Asia has driven the economic growth and today, almost half of the global chemical sales are owned by chemical companies from Asia. As the global economy expands towards the east, by 2035, at least half of the top 10 chemical companies will be based in Asia or the Middle East. To satisfy the demand in Asia, several European chemical companies have already shifted their activities to Asia and will continue to do so. Several key end markets have been driving the demand for chemical, such as the automotive, construction and pulp industries.

Additionally, considerably more than 50% of the worldwide building activities are taking place in Asia at the moment. Today, China alone produces 60% of the cement worldwide, followed by India. Besides building activities, both new constructions and renovations are partially associated with enormous increase in energy consumption, something which is in turn detrimental to energy efficiency and can be reduced by “intelligent materials”. The construction industry is probably the most important industry in China and India. Even other Asian countries such as Vietnam and Thailand are experiencing a construction boom with significant growth rates and infrastructure. Therefore, tomorrow’s chemical experts are required to be versatile strategists and should seize the opportunities that are lined up for the chemical industry in Asia.

Sources: A.T. Kearny, Inc., Singapore Economic Development Board