Master’s and PhD studies

Presented by:
Urban Westergren, professor
Department of Applied Physics
School of Engineering Sciences

Director China Relations

KTH web site  Facts about KTH  Study at KTH
KTH Royal Institute of Technology
One of the top technical universities in Europe
Short facts about KTH

• Established 1827 in Stockholm, Sweden

• People from more than one hundred nations

• Some numbers:
  - 13,000 full time students
  - 1,800 PhD students
  - 2,500 new students in master programs
  - 300 new PhD students each year
  - 600 members of faculty
Short facts about KTH

• QS ranking: Global World ranking 98 (2020) but many engineering areas are much stronger:

- Electrical Engineering: 17
- Architecture / Built Environment: 20
- Materials Science: 27
- Mechanical Engineering: 29
- Statistics & Operational Research: 37
- Mathematics: 38
- Civil & Structural Engineering: 42
- Computer Science & Info Systems: 43
- Chemical Engineering: 51-100
- Physics & Astronomy: 51-100
Is KTH a good choice for ZJU students? Yes!

<table>
<thead>
<tr>
<th>Field</th>
<th>KTH</th>
<th>ZJU</th>
</tr>
</thead>
<tbody>
<tr>
<td>General ranking</td>
<td>98</td>
<td>54</td>
</tr>
<tr>
<td>Electrical and Electronic Engineering</td>
<td>17</td>
<td>47</td>
</tr>
<tr>
<td>Architecture</td>
<td>20</td>
<td>51-100</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>29</td>
<td>51-100</td>
</tr>
<tr>
<td>Materials Science</td>
<td>27</td>
<td>35</td>
</tr>
<tr>
<td>Statistics and Operational Analysis</td>
<td>37</td>
<td>51-100</td>
</tr>
<tr>
<td>Computer Science and Information Systems</td>
<td>43</td>
<td>51-100</td>
</tr>
<tr>
<td>Civil and Structural Engineering</td>
<td>42</td>
<td>51-100</td>
</tr>
<tr>
<td>Mathematics</td>
<td>38</td>
<td>51-100</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>51-100</td>
<td>51-100</td>
</tr>
<tr>
<td>Physics and Astronomy</td>
<td>51-100</td>
<td>51-100</td>
</tr>
<tr>
<td>Chemistry</td>
<td>101-150</td>
<td>36</td>
</tr>
</tbody>
</table>

Yellow shading: higher rank than KTH
Red shading: lower rank than KTH
The Kingdom of Sweden

• About 10 million inhabitants, 2 million of whom live in the capital of Stockholm

• Has a pleasant climate thanks to the warm Gulf stream in the north Atlantic sea

• Combines a beautiful natural setting with modern technology and vibrant cities

• Home of the Nobel Prize, and many famous export companies, such as the examples on the next slide:
Sweden makes a lasting impression

Swedish entrepreneurship and ingenuity has helped shape the worlds of communication, furniture, fashion, music and much more. And no matter what the industry, there always seems to be that engineering approach.
Stockholm – a city of islands
Stockholm: a dynamic environment, modern, historic, clean air and water
Stockholm: an international city

- A multi-cultural European capital, communities from China, India and other countries
- A clean and safe city
- Quick access to city, campus and nature with excellent transportation: public, by bicycle or even by boat
- Swedes speak good English, very limited need to learn Swedish while studying in Stockholm
Stockholm student life, part of the city
KTH main campus
Five campuses close to industry
Education in close collaboration with industry

- KTH has five campuses in and around Stockholm city
- Each campus closely integrated with local industry
- Example: the campus in Kista is surrounded by the world’s largest collection of ICT businesses, more than 1000 companies, such as Ericsson, IBM, Intel, Sun, Compaq, Huawei, ZTE, and many more
- Master thesis can be written at a company, often leading to the first job after graduation
KTH - Research-based operations

- Total Revenue SEK 4.9 billion (ca RMB 3.8 billion)*

- Research and doctoral studies ca 67%
- Commissioned research ca 2%
- Education, first and second cycle ca 30%
- Purchased education ca 0.5%
- Commissioned education ca 0.5%

- Figure for 2016, exchange rate 1RMB = 1.3 SEK
Structure of education at KTH

- High school
- 3-year Bachelor of Engineering (In Swedish, ICT also in English)
- 2-year Master’s
- 4-year PhD (In English)

Time
Structure of MSc education at KTH

- **Research**: 1 semester
- **Courses**: 3 semesters

**BSc**
MSc programmes for entry in 2021

More than 60 programmes in several subject areas:

- Architecture and the Built Environment
- Computer Science
- Electrical Engineering
- Engineering Physics and Mathematics
- Energy and Sustainable Development
- Industrial Management and Innovation
- Information and Communication Technology
- Life Science Technology, Chemistry and Chemical Engineering
- Materials Science and Engineering
- Mechanical Engineering
Fees and Scholarships

There are application and tuition fees for non-EU/EEA/Swiss citizens for 1st and 2nd cycle studies (bachelor and master)

The tuition fee is SEK155k (about RMB120k*) for one year of full-time master’s study, architecture 70% higher and bachelor 20% lower

Scholarships are available, for example:
- KTH Scholarship (covering the tuition fee)
- SI: the Swedish Institute
- Joint programs: Erasmus Mundus and EIT (European Institute of Innovation and Technology)

* Assuming exchange rate RMB 1.0 = SEK 1.3
Living in Sweden

When applying for a residence permit, you must prove to the Swedish Migration Board that you will have a guaranteed sum of money at your disposal throughout the entire period of your studies. The amount is SEK 8514, about RMB 6550*, per month for ten months of the year.

Breakdown of budget per month, approximately:
- Food: RMB 1700
- Accommodation: RMB 3000
- Local travel: RMB 500
- Phone/internet: RMB 350
- Other: RMB 1000

* Assuming exchange rate RMB 1.0 = SEK 1.3
Joint MSc programs: two degrees from European universities

European Institute of Innovation and Technology (EIT)
- Combines education, research and business
- Master programs in ICT, energy and electrical systems
- Studies in two European countries
- Scholarships available

Erasmus+
- EU program at master and PhD levels
- Studies in (at least) two European countries
- Scholarships available

Nordic Five Tech
- Studies in two Nordic countries
Application requirements and process

• Completed Bachelor’s degree is required except for 3+2 applicants, see following slides for terms

• English proficiency has to be shown (TOEFL 90 with writing 20, IELTS 6.5 with no subscore below 5.5 etc)

• There are programme-specific requirements (see www.kth.se/en/studies/master)

• Apply at www.universityadmissions.se

• Online application period: October 16 to January 15

• Results of admission distributed on April 9
Application for KTH scholarship

• Applications for KTH scholarships are open from December 1 to January 15
• Applications are entered via the KTH web page:
  - Go to master studies: www.kth.se/en/studies/master/
  - Select “Scholarships” in the left menu and then “KTH scholarship”
• Scholarship opportunities: KTH Scholarship:
Application for KTH scholarship

An assessment of applicants for the scholarship is made based on the following criteria:

- The applicant's grades (GPA or equivalent)
- The ranking of the university where the applicant studied at bachelor level
- An overall assessment of the application by the professor in charge of the master program based on aspects relevant for the program. See “entry requirements; specific documents” for each master program.
- The applicant’s motivation how a future master degree from KTH will contribute to the sustainable development goals
Application for KTH scholarship

- Sustainable development goals
Application for KTH scholarship

• The motivation on sustainable development should at least show that the applicant has read the information on sustainability found in each master program description on the KTH web site. Example from a program: (scroll down to “Sustainable development”):

• Do NOT copy&paste from anything on the web! The motivation will be checked for plagiarism.
3+2 program

KTH MSc in 5 years from start of bachelor studies

4-year bachelor

KTH 2-year MSc

Admission to KTH MSc after 3 years
3+2 program

KTH and ZJU has a very successful 3+2 agreement since 2012

Students can apply during the 3\textsuperscript{rd} year of 4-year bachelor studies. These applicants must contact their home university administration.

Applications should follow the mapping agreed between bachelor majors and master programs. Applications outside of the mapping have a lower likelihood of admission.

Applications are made at universityadmissions.se, deadline January 15, 2021.
3+2 applications

Include a table of this type in your application, including what courses you will take during the 6th semester, example for KTH master program in Engineering Physics:

<table>
<thead>
<tr>
<th>KTH master program prerequisites, see “Entry requirements”</th>
<th>Corresponding bachelor level courses at your home university</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics (including classical mechanics, thermodynamics, electromagnetism, waves, geometrical optics and quantum mechanics) equivalent to at least 45 ECTS</td>
<td>List courses and briefly describe contents</td>
</tr>
<tr>
<td>Mathematics (including differential and integral calculus, linear algebra, differential equations and transforms, and statistics) equivalent to at least 35 ECTS</td>
<td>List courses and briefly describe contents</td>
</tr>
</tbody>
</table>

60 ECTS credits is one full academic year of studies. At bachelor level, the credits from a Chinese university can usually be multiplied by 1,5 to get the corresponding number of ECTS credits, i.e. 1 credit at a Chinese university corresponds to approximately 1,5 ECTS credits

ECTS = European Credit Transfer System
3+2 applications

Example for KTH master program in Computer Science:

<table>
<thead>
<tr>
<th>KTH master program prerequisites, see &quot;Entry requirements&quot;</th>
<th>Corresponding bachelor level courses at your home university</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics equivalent to at least 22,5 ECTS, there must be:</td>
<td>List courses and briefly describe contents:</td>
</tr>
<tr>
<td>1. a course in one-variable calculus,</td>
<td>1. ...</td>
</tr>
<tr>
<td>2. a course in linear algebra and</td>
<td>2. ...</td>
</tr>
<tr>
<td>3. a course in discrete structures</td>
<td>3. ...</td>
</tr>
</tbody>
</table>

Computer Science/Information Technology equivalent to at least 22,5 ECTS, there must be

1. a course in object oriented programming,                 
2. a course in algorithms and data structures and          
3. a course in computational complexity                    

List courses and briefly describe contents:                  
1. ...                                                       
2. ...                                                       
3. ...                                                       

Note: Computer Science is one of the most attractive programs at KTH with typically >10 applicants per position which makes the table above crucial for admission. Examples of other programs with typically >10 applicants per position are Machine Learning, Electric Power Engineering, Systems Control and Robotics, Civil and Architectural Engineering.
### ZJU – KTH 3+2 mapping

#### Possible transitions

<table>
<thead>
<tr>
<th>ZJU School of Biomedical Engineering and Instrument Science, major: Biomedical Engineering</th>
<th>KTH Medical Engineering</th>
</tr>
</thead>
</table>
| ZJU College of Biosystems Eng. & Food Science, major: Bioengineering | KTH Sustainable Technology  
KTH Industrial and Environmental Biotechnology  
KTH Medical Biotechnology |
| ZJU College of Chemical and Biological Engineering, major: Chemical Engineering and Technology | KTH Sustainable Technology  
KTH Chemical Engineering for Energy and Environment  
KTH Macromolecular Materials  
KTH Molecular Science and Engineering  
KTH Nanotechnology |
| ZJU College of Chemical and Biological Engineering, major: Pharmaceutical Engineering | KTH Sustainable Technology |
| ZJU College of Civil Engineering & Architecture, major: Civil Engineering | KTH Civil and Architectural Engineering  
KTH Real Estate and Construction Management (Students must have completed Engineering Economics, 2 credits; Engineering Project Management, 2 credits; Real Estate Economics and Evaluation, 2 credits; Civil Engineering Construction 3 credits or equivalent)  
KTH Environmental Engineering and Sustainable Infrastructure  
KTH Sustainable Technology  
KTH Transport and Geoinformation Technology  
KTH Engineering Mechanics |
### ZJU – KTH 3+2 mapping

#### Possible transitions

| ZJU College of Computer Science & Technology, major: Computer Science and Technology | KTH Transport and Geoinformation Technology  
KTH Communication Systems  
KTH Computer Science  
KTH Embedded Systems  
KTH Interactive Media Technology |
|---|---|
| ZJU College of Control Science and Engineering, major: Automation | KTH Electric Power Engineering (Maximum of 5 students)  
KTH Engineering Design (students only eligible for track Mechatronics)  
KTH Systems, Control and Robotics (Maximum of 3 students)  
KTH Information and Network Engineering (students must have completed 68190130 Signals & Systems, 11191240 Digital Signal Processing and 211G0250 Fundamentals of Programming) |
| ZJU College of Electrical Engineering, major: Automation | KTH Electromagnetics, Fusion and Space Engineering (Eligibility depending on student’s course selection, see prerequisites of the master program at www.kth.se)  
KTH Electric Power Engineering (Maximum of 5 students)  
KTH Embedded Systems |
| ZJU College of Electrical Engineering, major: Electrical Engineering and its Automation | KTH Embedded Systems |
| ZJU College of Electrical Engineering, major: Electronic Information Engineering | KTH Nanotechnology  
KTH Information and Network Engineering (students must have completed 211G0250 Fundamentals of Programming)  
KTH Communication Systems  
KTH Embedded Systems |
## ZJU – KTH 3+2 mapping
### Possible transitions

| ZJU College of Energy Engineering, major: Energy and Environmental System Engineering | KTH Sustainable Technology  
KTH Electromagnetics, Fusion and Space Engineering (Eligibility depending on student's course selection)  
KTH Sustainable Energy Engineering |
| --- | --- |
| ZJU College of Energy Engineering, major: Mechanical Design, Manufacturing and Automation | KTH Sustainable Energy Engineering  
KTH Production Engineering and Management  
KTH Engineering Design  
KTH Integrated Product Design  
KTH Vehicle Engineering  
KTH Engineering Mechanics (Students only eligible for track Fluid Mechanics. Total maximum of 4 students) |
| ZJU College of Energy Engineering, major: Renewable Energy Science and Engineering | KTH Sustainable Technology  
KTH Electromagnetics, Fusion and Space Engineering (Eligibility depending on student's course selection)  
KTH Sustainable Energy Engineering |
| ZJU College of Energy Engineering, major Vehicle Engineering | KTH Production Engineering and Management  
KTH Engineering Design  
KTH Integrated Product Design (students only eligible for track: Innovation Management and Product Development-IPDE)  
KTH Engineering Mechanics (Total maximum of 4 students) |
## ZJU – KTH 3+2 mapping

### Possible transitions

| ZJU College of Information Science and Electronic Engineering, major: Electronic Science and Technology | KTH Communication Systems  
KTH Electric Power Engineering (Maximum of 3 students)  
KTH Embedded Systems  
KTH Information and Network Engineering  
KTH Engineering Mechanics |
| ZJU College of Information Science and Electronic Engineering, major: Information Engineering | KTH Information and Network Engineering  
KTH Communication Systems  
KTH Embedded Systems |
| ZJU College of Information Science and Electronic Engineering, major: Microelectronic Science and Engineering | KTH Embedded Systems/Inbyggda system (Students only eligible to tracks Embedded Platform/Embedded Electronics & SoC Design)  
KTH Nanotechnology |
| ZJU School of Material Science and Engineering, major: Material Science and Engineering | KTH Nanotechnology  
KTH Engineering Materials Science |
| ZJU College of Mechanical Engineering, major: Industrial Engineering | KTH Engineering Design  
KTH Production Engineering and Management |
# ZJU – KTH 3+2 mapping

## Possible transitions

| ZJU College of Mechanical Engineering, major: Mechatronics Engineering | KTH Engineering Design (Students only eligible for track Mechatronics)  
KTH Integrated Product Design (Students only eligible to track: Innovation Management and Product Development-IPDE)  
KTH Production Engineering and Management  
KTH Embedded Systems |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ZJU Ocean College, major: Marine Science</td>
<td>KTH Sustainable Technology</td>
</tr>
<tr>
<td>ZJU Ocean College, major: Ocean Engineering and Technology</td>
<td>KTH Sustainable Technology</td>
</tr>
</tbody>
</table>
| ZJU College of Optical Science and Engineering, major: Opto-Electronics Information Science and Engineering | KTH Engineering Physics (Students eligible if the elective courses 66120011 Electromagnetic Field & Waves and 84190030 Quantum Optics: Fundaments and Applications have been taken at ZJU)  
KTH Nanotechnology |
| ZJU Department of Polymer Science and Engineering, major: Macromolecular Materials and Engineering | KTH Sustainable Technology  
KTH Macromolecular Materials  
KTH Nanotechnology |
Dual-degree master’s programmes: two degrees from KTH and ZJU

Study one year at KTH and the remaining part at ZJU

Tuition fees at KTH are waived

Subjects:
- Energy Engineering since 2016
- Optical Engineering from 2021

Contact your study administration for application instructions and program details
KTH exchange program

Partner university students can apply for exchange studies at KTH. Deadlines: April 15 and October 15, see: KTH (www.kth.se/en/) / Study at KTH / Exchange studies

Students can study for up to 1 year and do not have to pay tuition fees for exchange studies which do not result in a degree

During or after exchange studies, it is possible to apply, in competition, for admission to a KTH master program which results in a degree

Contact your study administration for details
After graduation with master degree

• After a KTH master degree: 1 year residence permit to look for a job or a PhD student position
  - KTH PhD student positions are publically announced at the web site, KTH MSc students may have an advantage
  - Many former KTH MSc students from enrol as KTH PhD students

• After a KTH PhD degree: permanent residence permit in Sweden

• KTH graduates find positions all over the world
Career prospects after a KTH degree

• Statistics for master’s programmes:
  - 50% had a job even before graduation
  - >90% had a job within 6 months of graduation
  - >30% became PhD students
PhD studies

- Three years of full-time research, one year of courses
- Engages around 2,000 people
- A large proportion international PhD students
- A candidate has to apply for a position
- All PhD student positions are announced on the KTH web site: https://www.kth.se/en/studies/phd
- Employment with a salary if admitted, but competition for positions
Things you can do after finishing education at KTH...

Thermal design engineer at Zhejiang Dahua Technology Co. Ltd, China, 2018

- Master in Sustainable Energy Engineering
  KTH, Sweden, 2017

- Bachelor in Energy and Environment System Engineering (KTH-ZJU 3+2)
  Zhejiang University, 2016
Engineer at Vector Informatik, China

- Master in Sustainable Energy Engineering
  KTH, 2018

- Bachelor in Energy and Environment System Engineering, Zhejiang University, 2016
Things you can do after finishing education at KTH...

Project Engineer, Marvel-tech Shanghai

- Dipl. Ing. In Energy Engineering ZheJiang University, China, 2014.
Things you can do after finishing education at KTH...

- PhD candidate in systems and networking at University of Pennsylvania, USA

- Wireless Systems (Now Information and Network Engineering), Master of Science, KTH, 2016-2018

- Automatic Control, Bachelor of Engineering, Zhejiang University, 2013-2017 (KTH-ZJU 3+2)
Permanent researcher, KTH. Consultant at the company EPS AB.

- Researcher at Energy Technology Department. KTH, Sweden, 2018-2020.
- Postdoctor at Energy Technology Department. KTH, Sweden, 2016-2018.
- MSc in Engineering Thermophysics. Zhejiang University, China, 2010
Things you can do after research at KTH...

Professor & Vice Dean  
School of Energy Engineering  
Zhejiang University

- Postdoc in Energy Technology, KTH, 2009
- PhD in Engineering Thermal Physics, ZJU, 2005
- Bachelor & Master in Thermal Engineering  
  ZJU, 1995 & 2000
Things you can do after finishing education at KTH... go into space!

Professor Christer Fuglesang
Professor in Space Physics, KTH

- Astronaut at European Space Agency 1992-present

- PhD in Experimental Particle Physics Stockholm University, 1986
- Master in Engineering Physics KTH, 1981
Things you can do after research at KTH… collect the Nobel prize!

Professor Hannes Alfvén

• Nobel Prize in Physics, 1970 for Magnetohydrodynamics

• Professor in Electrical Engineering University of California, 1967-1991

• Professor in Electromagnetic Theory and Electrical Measurements KTH, 1940-1991

• PhD in Electromagnetic Waves Uppsala University, 1934
Nobel Prize ceremony in Stockholm on December 10 every year

... may take a few years after graduation...
International students from KTH attended the Nobel Banquett in, the Stockholm City Hall, dressed in traditional costumes.
Welcome to KTH: launch your career!