Technical University of Munich
School of Engineering and Design
Bachelor Aerospace

Ottobrunn
October 13, 2022
“Space Valley” in the Metropolitan Region of Munich
TUM SoED - Department of Aerospace and Geodesy

Launched by TUM on May 9, 2018 as an engineering department

28 Professors

900+ Students, thereof 1/3 female and 1/2 international

5 Locations:
- Ottobrunn/Taufkirchen
- Garching
- Oberpfaffenhofen
- Munich
- Wettzell
# Professorships

Strengthening future fields of research – bridging between disciplines - attracting ambitious young talents

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<th>Aeronautics</th>
<th>Space</th>
<th>Geodesy</th>
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<td>Aerospace Aerodynamics</td>
<td>Aerospace Structure Design</td>
<td>Astronomical and Physical Geodesy</td>
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<td>Prof. Christian Breitsamter</td>
<td>Prof. Fernaß Daoud</td>
<td>Prof. Christoph Holst</td>
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<td>Aircraft Design</td>
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<td>Geodetic Geodynamics</td>
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<td>Prof. Mirko Hornung</td>
<td>Prof. Ulrich Walter</td>
<td>Prof. Florian Seitz</td>
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<td>Autonomous Aerial Systems</td>
<td>Lunar and Planetary Exploration Technologies</td>
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<td>Prof. Markus Ryll</td>
<td>Prof. Philipp Reiß</td>
<td>Prof. Thomas Kolbe</td>
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<td>Carbon Composites</td>
<td>Pico and Nano Satellites, and Satellite Constellations</td>
<td>Land Management and Land Tenure</td>
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<td>Prof. Klaus Drechsler</td>
<td>Prof. Alessandro Golkar</td>
<td>Prof. Walter de Vries</td>
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<td>Space Propulsion</td>
<td>Photogrammetry and Remote Sensing</td>
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<td>Prof. Sophie Armanini</td>
<td>Prof. Chiara Manfletti</td>
<td>Prof. Uwe Stilla</td>
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<tr>
<td>Flight System Dynamics</td>
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<td>Remote Sensing Technology</td>
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<tr>
<td>Prof. Florian Holzapfel</td>
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<td>Prof. Richard Bamler</td>
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| | | Satellite Geodesy |
| | | Prof. Niklas Boers |
| | | Prof. Urs Hugentobler |

more professorships until 2024
Research

Cutting-edge research, innovative teaching and technology development with social relevance

Mobility & Urbanization
- Smart networking of traffic
- High-precision surveying
- Urban planning
- Navigation & communication
- Autonomous flight
- New materials & manufacturing processes
- Simulation & tests

Environment & Food
- Quantifying global and local processes
- Climate protection measures
- "Space weather"
- Space debris
- Traffic turnaround
- "Green flying"
- Increasing yields in agriculture
- Food security

Security & Cooperation
- Technical security & reliability
- Data protection
- Global cooperation
- International security

Fascination & Knowledge
- Space exploration
- Creation and development of the universe
- Promoting enthusiasm for technology
- Attracting international talents

Global trends & disruptive changes ▶ Innovations and new business models
Why study Aerospace now?!

In spite of what you may have heard about the aerospace industry, there are plenty of exciting developments:

- **Urban Air Mobility**
- **Communication & Navigation**
- **Hyperloop Technology**
- **Micro-Satellites & Re-usable Rockets**
- **Unmanned Aerial Vehicles**

![Picture: Volocopter](image1)
![Picture: Mynaric](image2)
![Picture: TUM Hyperloop](image3)
![Picture: Isar Aerospace](image4)
![Picture: Quantum Systems](image5)
Global Rankings

TUM is highly ranked in Engineering and Aerospace world-wide

<table>
<thead>
<tr>
<th>Rank</th>
<th>University Name</th>
<th>Country</th>
<th>QS World University Ranking</th>
<th>Academic Ranking of World Universities (Shanghai Ranking) for Aerospace Engineering</th>
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<tr>
<td>13</td>
<td>Massachusetts Institute of Technology (MIT)</td>
<td>USA</td>
<td>15</td>
<td>16 Massachusetts Institute of Technology (MIT)</td>
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<td>14</td>
<td>University of Maryland, College Park</td>
<td>USA</td>
<td>16</td>
<td>14 University of Maryland, College Park</td>
</tr>
<tr>
<td>15</td>
<td>The University of Texas at Austin</td>
<td>USA</td>
<td>17</td>
<td>15 The University of Texas at Austin</td>
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<td>16</td>
<td>Technical University of Munich</td>
<td>Germany</td>
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<td>16 Technical University of Munich</td>
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<td>16</td>
<td>Technion-Israel Institute of Technology</td>
<td>Israel</td>
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<td>16 Technion-Israel Institute of Technology</td>
</tr>
<tr>
<td>18</td>
<td>Stanford University</td>
<td>USA</td>
<td>20</td>
<td>18 Stanford University</td>
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</tbody>
</table>

http://www.shanghairanking.com/Shanghairanking-Subject-Rankings/aerospace-engineering.html

Times Higher Education - Engineering

Times Higher Education Employability Ranking: Number 1 in Germany

MISSION EARTH
COMPREHENDING OUR WORLD IS MOVING OUR WORLD
## Curriculum

- **Content:** Competences are acquired and build upon each other.

- The program is taught entirely in English.

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### Engineering Experience (Design, Systems and Practical Application)

- **1st Semester (Winter):** Introduction into Aerospace
- **2nd Semester (Summer):** Introduction into Geodesy
- **3rd Semester (Winter):** CAD/TD for Aerospace Engineers
- **4th Semester (Summer):** System Elective
- **5th Semester (Winter):** Engineering Internship
- **6th Semester (Summer):** Engineering Project, Aerospace Lab Course I, Aerospace Lab Course II

### Core Disciplines

<table>
<thead>
<tr>
<th>Core Discipline</th>
<th>1st Semester (Winter)</th>
<th>2nd Semester (Summer)</th>
<th>3rd Semester (Winter)</th>
<th>4th Semester (Summer)</th>
<th>5th Semester (Winter)</th>
<th>6th Semester (Summer)</th>
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</thead>
<tbody>
<tr>
<td>Mathematics and Systems Theory</td>
<td>Advanced Mathematics I</td>
<td>Advanced Mathematics II</td>
<td>Advanced Mathematics III</td>
<td>Test, Analysis, and Simulation</td>
<td>Control Theory</td>
<td></td>
</tr>
<tr>
<td>Fluid Mechanics &amp; Thermodynamics</td>
<td></td>
<td></td>
<td>Fluid Mechanics I</td>
<td>Fluid Mechanics II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical &amp; Computer Engineering</td>
<td>Electrical Engineering (1)</td>
<td>Electrical Engineering (2)</td>
<td>Thermodynamics I</td>
<td>Thermodynamics II</td>
<td>Heat Transfer</td>
<td></td>
</tr>
</tbody>
</table>

### Specialization and Diversification

- **Modeling Elective**
- **Free Elective**
- **Supplementary Course**

Note: Arrows illustrate most important connections between modules (based on content and acquired competences).
# Modules

<table>
<thead>
<tr>
<th>1st Semester (Winter)</th>
<th>2nd Semester (Summer)</th>
<th>3rd Semester (Winter)</th>
<th>4th Semester (Summer)</th>
<th>5th Semester (Winter)</th>
<th>6th Semester (Summer)</th>
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</thead>
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<tr>
<td>Advanced Mathematics I</td>
<td>Advanced Mathematics II</td>
<td>Advanced Mathematics III</td>
<td>Test, Analysis, and Simulation</td>
<td>Engineering Internship</td>
<td>Aerospace Lab Course I</td>
</tr>
<tr>
<td>Aerospace Materials Science and Processing</td>
<td>Aerospace Structures and Elements</td>
<td></td>
<td></td>
<td>Engineering Project</td>
<td>Free Elective</td>
</tr>
<tr>
<td>CAD/TD für Aerospace Engineers</td>
<td>Thermodynamics I</td>
<td>Thermodynamics II</td>
<td>Heat Transfer</td>
<td>(optional) Engineering Elective</td>
<td>(optional) Engineering Elective</td>
</tr>
<tr>
<td>Engineering Computer Science I</td>
<td>Engineering Computer Science II</td>
<td>Fluid Mechanics I</td>
<td>Fluid Mechanics II</td>
<td>Supplementary Course</td>
<td>Supplementary Course</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Introduction into Geodesy</td>
<td>System Elective</td>
<td>Modeling Elective</td>
<td>Bachelor’s Thesis</td>
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</table>

**Key:**
- To complete within first year
- Required Core Subjects
- Pass/Fail Requirements
- Core Electives
- Additional Electives
- Practical Engineering Experience
- Bachelor’s Thesis
Access requirements

(Formal) requirements for admission:

- Application for Admission (to be filled out in the TUMonline application portal)
- Higher education entrance qualification (HZB)
  → for international applicants: preliminary examination documentation (VPD) from uni-assist
- English language cover letter (motivation, personal interest)
- ID (e.g. passport)
- Complete, current CV in English
- German A2 language certificate
- English B2 language certificate (or stage II of Aptitude Assessment Procedure)
- If available, proof of relevant extracurricular activities
  (e.g. participation in "Jugend forscht", Mathematics Olympiad, Science Competitions, Awards, etc.)
- Proof of 8-week pre-study internship

→ Passing the aptitude assessment procedure
Student Groups

Join student initiatives, design, build your ideas, compete and have fun!

**WARR:** Invent CubeSats and Nano-Satellites

**Hummingbirds:** Make turbines hum

**AkaModell:** Model your way to success

**Akaflieg:** Construct a plane and fly

**Horyzn:** Create a startup and take off vertically
Student Groups

Links

- TUM Hyperloop: Development of climate-neutral, ground-based transportation system
  https://tumhyperloop.de/?lang=de#home

- WARR: Development and construction of astronautical technologies, e.g. rocket propulsion, space elvator, Mars rover, ...
  https://warr.de/de/
  https://en.wikipedia.org/wiki/WARR_(TUM)

- HORYZN: Design, simulation and building of aviation prototypes
  https://horyzn.org/

- MOVE III: Development and operation of a small satellite
  https://www.move2space.de/missions/move-iii/
Thank you for your attention.

Contact, help, study counseling:

Study Program Coordinator
coordination.asg@ed.tum.de
Irma Pasagic

Student Advising Office
studium@tum.de

Student Council
info.fslrg@ed.tum.de
https://www.sv.tum.de/en/lrg/homepage/

Visit our Wiki: https://wiki.tum.de/display/edschooloffice/B.Sc.+Aerospace
Applying for Bachelor: https://www.tum.de/en/studies/application/bachelor/application-bachelor
For international students: https://www.tum.de/en/studies/international-students

Frequently Asked Questions?!