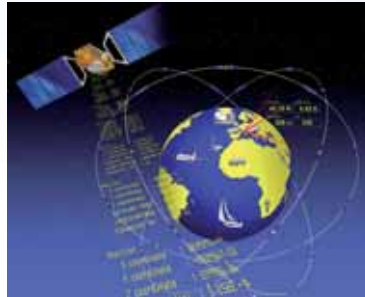


Observation from Space requires knowledge about the satellite system



Future European navigation system GALILEO

- accurate positioning, which is crucial to any kind of navigation system, such as the future European navigation system GALILEO
- satellite data for studies on global change for modelling geophysical processes, e.g. in the fields of climate, water cycle or geodynamics
- remote sensing data for updating geographic information system (GIS), which is especially critical for remote areas that are difficult to access.



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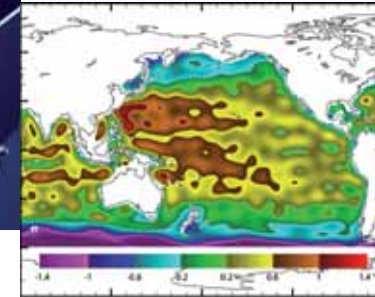
# Earth Oriented Space Science and Technology

24 month M.Sc. Program  
 Conducted in English

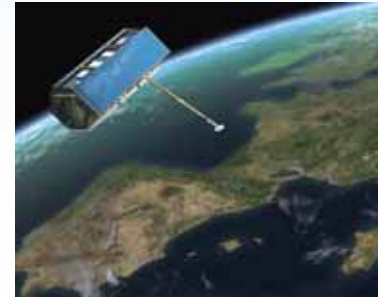


## ESPACE Earth Oriented Space Science and Technology

International Master's Program at the Technische Universität München



Ocean topography map based on satellite data



The German radar satellite TerraSAR-X

**Join ESPACE and become a Satellite Applications Engineer**

ESPACE's primary goal is to educate future satellite application engineers. After graduating the program, students may continue their work with

- satellite images for providing national/international agencies with essential information on security, disaster and environmental issues





## Background and Objective

Earth observation satellites help us better understand and monitor our environment. Today, researchers within climatology, oceanography, meteorology as well as national agencies and logistic companies depend on up-to-date satellite data. The importance of the navigation system GPS, the meteorological satellites METEOSAT or the geo-scientific satellite ENVISAT are undeniable.

Design, development and realization of such missions require not only knowledge from a wide spectrum of disciplines such as spacecraft design, orbit control and data management, but also from the fields of Earth system science, remote sensing or navigation. From the educational point of view, this diversity is a challenge. Standard university programs cover parts of this spectrum in different disciplines such as aerospace engineering, electrical engineering or geodesy, - just to mention a few. However, there is hardly any connection between these parts.

Therefore several institutions in and around Munich decided to combine their expertise and set up a graduate program. The ESPACE Master's Program was established in 2005. Its multidisciplinary nature and combination of space technologies with its applications make it an exceptional Master's Program.

## Expertise in Munich

ESPACE benefits from and utilizes its location in Munich with the city's unique concentration of expertise related to Space Science and Technology in industry, research institutions and universities in and around Munich. The program is coordinated at the Technische Universität München (TUM) with teaching staff from

- 3 Universities (TUM, Ludwig-Maximilians-Universität, University of Federal Armed Forces)
- Research Institutions (such as the German Geodetic Research Institute (DGFI) and the German Aerospace Center (DLR))
- Space industry in and around Munich

Experienced researchers from these institutions are directly involved in ESPACE as teachers or guest lecturers. ESPACE therefore offers its students valuable contact with state of the art research as well as insight into current Earth observation satellite missions.

## Master's Program

- The successful participation in all examinations and the completion of the Master's Thesis leads to the academic degree "Master of Science" (M.Sc.).
- The first two semesters combine satellite techniques with mathematical/physical foundations
- Specialization in the third semester in either
  - Earth System Science
  - Remote Sensing or
  - Navigation
- The last semester is dedicated to a Master's Thesis

ESPACE students have also the opportunity to participate in a Double Degree Program with Wuhan University in China.

After completion of the Master's program, highly qualified students can enhance their knowledge in a Ph.D. program.

## Career Perspectives

ESPACE graduates can be best described as satellite application engineers, now working or doing PhD studies in national space agencies, space industry, research institutions, or universities.

## Admission Requirements

An above-average Bachelor degree, a Master or a Diploma degree in science or engineering, e.g., Aerospace, Electrical, Communication, or Environmental Engineering, Mathematics, Physics, Informatics, Geodesy, etc. Non-native speakers of English will be required to submit an adequate TOEFL or IELTS score. The application deadline is around March 15 for the following winter term (starting in mid-October).



## TUM and the city of Munich

About 20.000 students from all over the world are currently enrolled at the TUM, one of Germany's most renowned universities for sciences and engineering. TUM regularly takes leading positions in national and international university rankings.

Munich is the capital of Bavaria, located in the heart of Europe. This 800-year-old city with 1.2 million inhabitants is one of the major cultural centers of Germany. The nearby Alps provide opportunities for hiking and skiing. The lakes and beautiful sights of southern Bavaria allow relaxing weekend trips.

|                        |  |   |  |
|------------------------|--|---|--|
| Semester<br><b>4</b>   | <b>Master's Thesis</b> <small>credits 30</small>   |   |  |
| Semester<br><b>3</b>   | <b>compulsory</b> <small>credits 6</small>   | <b>elective advanced courses</b> <small>credits 24</small>  |  |
|                        | Ground and User Segment, Project   | <b>Earth System Science</b><br>Atmosphere and Ocean, Earth System Dynamics, Earth Observation Satellites              | <b>Remote Sensing</b><br>Photogrammetry, Geo-Information, Remote Sensing |
| Semester<br><b>1-2</b> | <b>foundations in space engineering and science</b> <small>credits 60</small>                  |   |  |
|                        | <b>Space Engineering</b><br>Spacecraft Technology, Orbit Mechanics, Orbit and Attitude Control | <b>Mathematical/Physical Foundations</b><br>Signal Processing, Numerical Modeling, Electrodynamics, Estimation Theory | <b>Introduction</b><br>Remote Sensing, Navigation, Earth System Science  |