Institut Teknologi Bandung

Geodesy and Geomatics Engineering

Mapping the Earth, Shaping the Future






GEODESY AND GEOMATICS ENGINEERING
FACULTY OF EARTH SCIENCES AND TECHNOLOGY
INSTITUT TEKNOLOGI BANDUNG

UNDERGRADUATE PROGRAM HANDBOOK

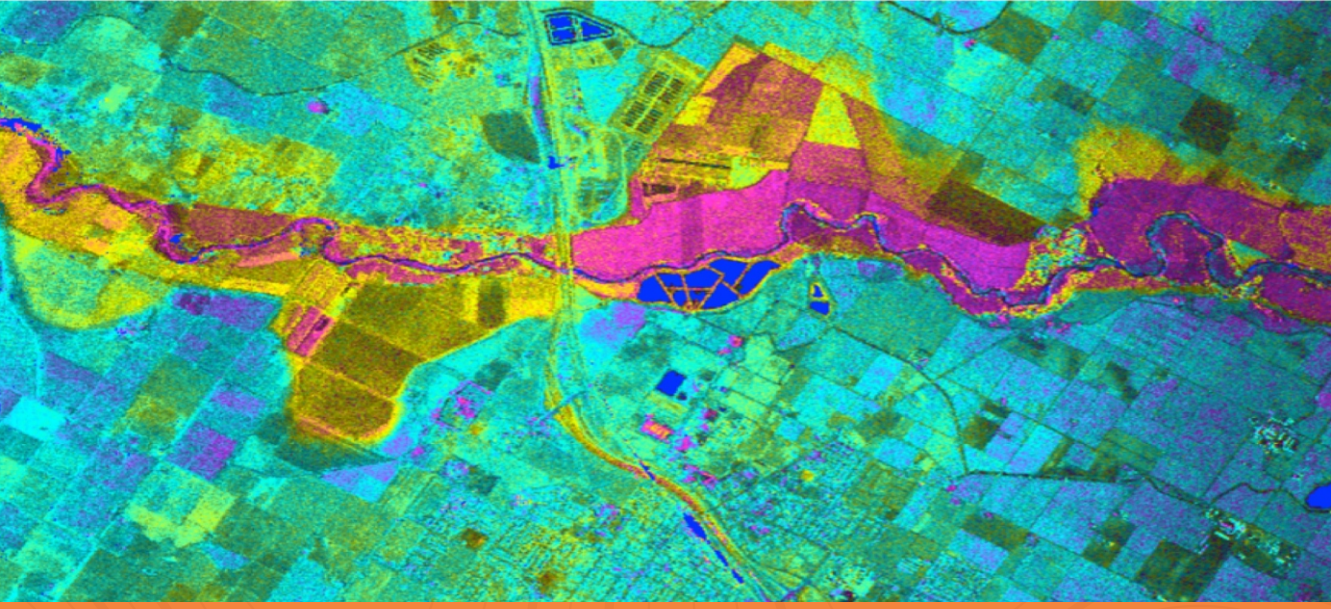
Profile of Geodesy and Geomatics Engineering ITB

Goals

To produce graduates who acquire integrated knowledge in geodesy and geomatics engineering as required by industry, professional practice, and public services; possess the skills to apply this knowledge in solving relevant problems in industry, professional domains, and public services; are capable of addressing open and complex problems, particularly through engineering solutions that integrate technical, design, socio-economic, cultural, environmental, and business aspects; demonstrate the ability to adapt, adjust, and develop independently, as well as compete globally; and uphold ethical and professional standards.

Values

The Geodesy and Geomatics Engineering Program is guided by the core values of Excellence, Dignity, Independence, and global Recognition. These principles shape our academic culture, research priorities, and professional conduct, ensuring that every graduate embodies the standards expected of aa world-class geospatial engineer.



Why study Geodesy and Geomatics at ITB?

- Strong foundation in basic science
- Leading expertise in technical and analytical geodesy and geomatics
- Extensive industrial exposure
- High international exposure
- Accredited internationally (ASIIN) and nationally with excellence
- Highly qualified educators
- Well-equipped laboratory instruments
- Supportive academic and research environment
- Active and innovative student community

Job Prospects

- Oil, gas, and energy
- Remote sensing & satellite data industry
- Technology & data industry
- Defence, security, and disaster management
- Marine & coastal management
- Agriculture & forestry
- Infrastructure & construction
- Land administration & surveying services

Curriculum

Unlock a comprehensive and flexible learning journey designed to build both strong foundations and specialised expertise:

- 34 Credits – Compulsory Courses: Core competencies that establish essential academic and professional skills.
- 83 Credits – Core Courses: Comprehensive disciplinary learning that equips you for advanced expertise in your field.
- 27 Credits – Elective Courses: A selection of elective subjects that allows you to tailor your academic pathway and explore interdisciplinary interests.

1st Semester	2nd Semester	3rd Semester	4th Semester
Mathematics I	Applied Linear Algebra	Statistics and Probabilistics	Estimation and Approximation
General Physics I	Mechanics and Gravity	Physics of Waves	Geodetic Computation
General Chemistry I	Introduction to Engineering and Design	Sports	Fundamentals of Physical Geodesy
Pancasila	Artificial Intelligence and Data Literacy	Positioning	Geometric Reference System
Computational Thinking	English	Geometric Geodesy	Terrestrial Mapping
Introduction to Principles of Sustainability	Indonesian Language	Geospatial Law and Regulation	Satellite Geodesy
Basic Physics Laboratory	Earth System	Geospatial Expedition	
Basic Chemistry Laboratory			

5th Semester	6th Semester	7th Semester	8th Semester
Spatial Database	Civic Education	Geographic Information System	Industrial Engineering Management
Cartography	Religion	Cadastre System	Environmental Geography
Hydrography	Construction Surveying	Internship	Capstone Project
Photogrammetry	Remote Sensing	Capstone Project Proposal	
GNSS Surveying	Thematic Mapping		
	Field Camp		

Elective Course

Elective courses can be selected:

Advance Physical Geodesy	Land Valuation
Advanced Photogrammetry	Marine Geodesy
Cadastral Survey	Met-Ocean Analysis
Drainage Survey and Mapping	Nautical Sciences
Energy and Resources Management Boundary Survey	Offshore Positioning
Environmental Remote Sensing	Pipeline Network & Tunnel Surveying
Geographic Information System Modeling	Precise Surveying
Geodesy for Disasters	Road Surveying and Road Database (Leger)
Geodetic Modeling for Disaster Scenario	Spatial Quantitative Analysis
Geodetic Monitoring System for Infrastructures	Technical Aspects of 3D Cadastre
Geodetic Observations for Climate Change	Three Dimensional (3D) City Digital Modeling
Geokinematic	Three Dimensional (3D) City Mapping with Drone
Geospatial Information System for Smart Cities	
Geospatial Intelligence	
GNSS Applications	

University Partners

Ongoing Collaborations:
- Technische Universität München, Germany
- Technische Universität Hamburg, Germany
- HafenCity University, Germany
- Universiti Teknologi Malaysia

Prospective Collaborations:
- Óbuda University, Hungary
- University of Philippines Diliman
- Henan Polytechnic University, China

Collaborative Networks:
- ASEAN – European Academic University Network (ASEA-UNINET)
- Asian International Mobility for Students (AIMS)

Admission

For an up to date information on admission, schedule, and requirements, please refer to: https://admission.itb.ac.id.

Field Course

As part of its practical-based curriculum, the Geodesy and Geomatics Engineering Program at ITB integrates several field courses designed to strengthen students' technical, analytical, and operational skills in real-world environments.

I. Geospatial Expedition

The Geospatial Expedition course introduces students to the fundamentals of outdoor geospatial operations, focusing on team formation, safety, navigation, and expedition planning. Students learn to assess environmental risks, use traditional navigation tools, and perform survival techniques essential for field-based activities.

Course Highlights:

- Team formation and maintaining group cohesion
- HSE induction, risk identification, and risk mitigation
- Expedition concepts, equipment management, and logistics
- Travel safety and physical readiness for field activities
- Map interpretation, contour creation, and navigation
- Compass-based navigation (on campus and in open nature)
- Outdoor survival skills, including basic rigging
- Expedition itinerary and supply planning

II. Field Camp

Field Camp immerses students in real-world surveying and mapping workflows. The course trains students to plan field operations, conduct measurements using professional equipment, and manage the full cycle of a geospatial project from proposal development to fieldwork execution and final reporting.

Course Highlights:

- Field operation planning and team building
- HSE induction and safety preparations
- Introduction to surveying and mapping instrument systems
- Guided field practice and data acquisition
- Data processing, map production, and results presentation
- Technical and non-technical report writing

III. Hydrography

The Hydrography course provides specialized training in waterbody mapping, acoustic survey systems, tidal analysis, and seabed imaging. Students study key hydrographic tools and perform field practicums involving equipment calibration, data acquisition, and bathymetric data processing.

Course Highlights:

- Principles and elements of hydrography
- Acoustic survey tools:
  - Single-beam echosounder
  - Multibeam echosounder
  - Sidescan sonar (SSS)
  - Sub-bottom profiler (SBP)
- Bathymetric survey procedures and sounding techniques
- Tidal observation, tidal datum determination, and tidal analysis
- Bathymetry data processing, reduction, and mapping
- Water-bottom assessment and imaging (SBP & SSS)
- Introduction to non-acoustic bathymetry
- Hydrographic product quality and presentation standards

Integrated Bachelor-Master Program

The Integrated Bachelor-Master Program (PISM, Program Integrasi Sarjana-Magister) offers a streamlined pathway for undergraduate students who wish to continue directly into a master's degree.

PPSM students are highly likely to receive the GTA 100 Scholarship, which covers 100% of tuition fees and provides a monthly stipend, making the Fast-Track program an academically and financially rewarding opportunity.

Requirements for PISM

Program Structure and Study Duration

1. The PISM program is designed to be completed within a total of 10 semesters.
2. Undergraduate students begin taking master 's-level courses in Semesters 7 and 8 and then complete the master's program in an additional 2 semesters.

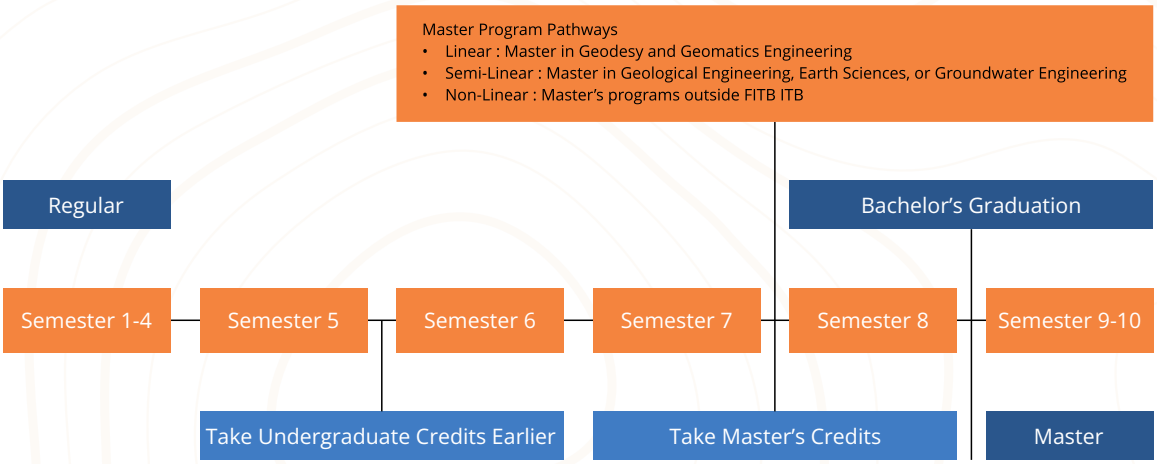
Academic Scope

1. The program may be taken within the same field, a related field, a non-linear field, or across disciplines.
2. For cross-disciplinary PISM pathways, additional requirements may apply to ensure alignment of fundamental competencies.

Registration and Transition

1. Students may register from Semester 3 up to Semester 7. Those applying in Semester 7 must have completed at least 110 credits.
2. Requirements: Must be an active ITB undergraduate student with a minimum GPA of 3.00 and no D grades.
3. Internal ITB PISM students are exempt from TOEFL/ELPT-ITB and TPA requirements for master's program admission.
4. Upon completing the bachelor's degree, students will automatically receive a graduate student ID number (NIM) and be officially enrolled in the master's program in the following semester.

PISM Pathway Overview



Master Program

The Master's Program in Geodesy and Geomatics Engineering focuses on developing competencies in creating, advancing, and innovating knowledge, technology, and specialised professional practices. Students are equipped with expertise aligned with one of the following specialisations:

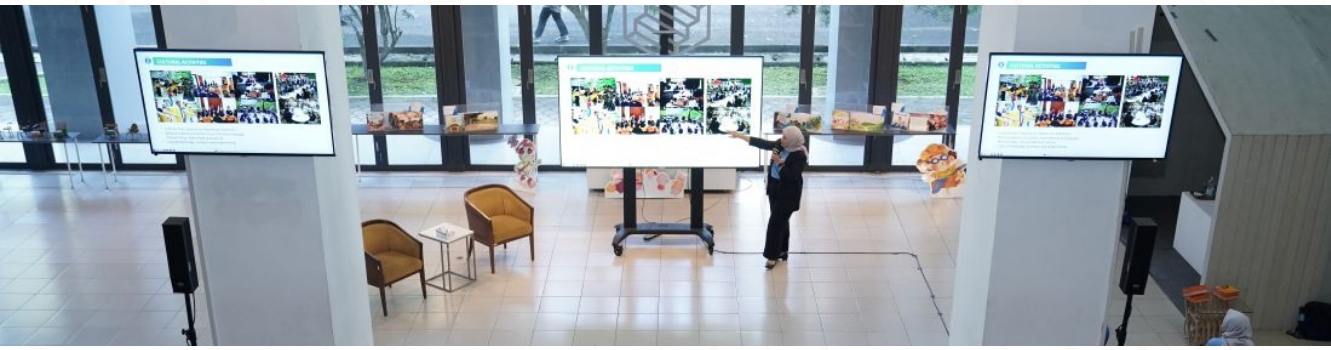
1. Geospatial-Based Disaster Risk Management
2. Geodesy and Geomatics Engineering
3. Land Administration
4. Hydrography

The Master's Program in Geodesy and Geomatics Engineering at ITB also offers a Multidisciplinary Track, allowing students to strengthen their geospatial expertise through courses from other departments—such as data analytics, deep learning, and big data systems.

International Undergraduate Program

The International Undergraduate Program (IUP) provides a competitive educational experience of **international quality**, fostering a global learning atmosphere for all students. As part of ITB's commitment to serving prospective students from non-national curriculum high schools, the program is open to both Indonesian and foreign nationals.

The curriculum is designed to prepare students for **global competitiveness**, requiring a minimum of one semester of outbound exchange to ITB's partner universities abroad. This provides exposure to **world-class learning** environments and opportunities to build a valuable global network. All academic activities in the International class are **delivered entirely in English**.



Why international class in Geodesy and Geomatics at ITB?

We offer a globally oriented learning environment that expands students' opportunities through international exposure and an integrated route to master's studies.

- International Exposure
  Opportunities for **outbound exchange, joint supervision**, and engagement with **visiting professors**.
- Integrated Bachelor-Master Integration Program (IBMP)
  A streamlined pathway that allows qualified students to **continue** into a **master's program** within an **accelerated timeframe.**

IUP Students Experiences

Technische Universität München (TUM)

About TUM

TUM is ranked #1 in Germany and 22nd worldwide (QS WUR 2026). Located in Munich, a global hub for technology and industry—home to BMW, Siemens, and Allianz—TUM offers:

- A strong engineering and science foundation with global recognition
- A highly international academic environment
- Access to cutting-edge research facilities and industry connections
- Specialized courses that allow students to deepen their expertise beyond the undergraduate level

Academic Information

- University : Technical University of Munich
- School : School of Engineering and Design
- Program : Geodesy & Geoinformation
- Credits Earned : 30 ECTS (equivalent to ~18–20 SKS)

Sample Courses Taken:

- Satellite Altimetry and Physical Oceanography
- Integrated Land and Water Management
- Hydrogeodesy: Monitoring Surface Waters from Space
- Advanced GIS for Environmental Engineering – Theory
- Entrepreneurship
- Financial Accounting

Academic Experience at TUM

1. **Independent Learning Culture**
   The learning system at TUM emphasizes self directed study (Selbststudium). Students are expected to be proactive in organizing their study schedules, reviewing lecture materials, and preparing for exams without constant supervision. This differs significantly from Indonesia's more guided style and encourages academic maturity.

2. **Deep Theoretical Foundation**
   Lectures focus not only on the application of tools but also on the mathematical and physical principles behind geospatial technologies.
   As a result, concepts may feel dense and abstract, but they build a strong academic foundation for advanced work or graduate studies.

3. **World-Class Facilities**
   The Garching campus provides access to:
   - Research laboratories
   - High-performance computing
   - State-of-the-art GIS and geodesy equipment

   These resources are open for students who wish to pursue research or deepen their project work.

4. **Learning Structure**
   Most courses consist of:
   - Vorlesung (Lecture) : Conceptual and theoretical sessions in large halls
   - Übung (Exercise/Tutorial) : Problem-solving sessions to apply theory in practice

   This structure helps reinforce complex material step-by-step.

5. **Examination System**
   Assessment is typically based on one final exam (Klausur) worth 100% of the grade.There are usually:
   - No attendance grades
   - Minimal weekly assignments
   - High expectations for exam preparation

   This system strengthens discipline and time-management skills, especially during the “lecture-free period,” when students must study independently.

Social & Cultural Experience

1. **Language & Daily Life**
   - English is widely used in graduate-level lectures, but basic German is helpful for daily interactions
   - Locals may seem reserved at first, but they are generally polite and helpful
   - Munich is highly international; English works well in most urban areas
   - Punctuality (Pünktlichkeit) is a key cultural value, public transport and personal appointments are strictly on time

2. **Food, Living, and Cost of Life**

   Munich is known for its high living costs, especially accommodation. However, students benefit from:

   - Mensa (University Canteen): Affordable meals (€4–€5) with large portions
   - Halal Options: Many Döner Kebab shops serve halal food
   - Asian Markets: Easy access to Asian ingredients for Indonesian food

   These options help reduce daily expenses and maintain comfort abroad.

3. **Friends, Community, and Travel**

   - Munich's strategic location in Central Europe allows easy weekend trips to Austria (Salzburg), Switzerland, or northern Italy
   - Student activities, such as TUM SOM Student Council events, provide opportunities to meet peers from Europe, Asia, and Latin America
   - The multicultural environment encourages global networking and broadens perspectives.

IUP Students Experiences

Universiti Teknologi Malaysia (UTM)

About UTM

UTM is ranked #153 in the world and #25 in Asia (QS World University Rankings 2026).Located in Johor Bahru, UTM is known for:

- A wide range of specialized and practice-based courses
- Strong emphasis on hands-on learning and real-world applications
- Comprehensive laboratory facilities accessible to students
- Affordable cost of living for international students

UTM is a popular destination for geospatial and engineering students seeking both theoretical and practical experience.

Academic Information

- Faculty : Faculty of Built Environment and Surveying
- Program : Geomatics Engineering
- Credits Earned : 15 SKS

Sample Courses Taken:

- Industrial Survey
- Terrestrial Laser Scanning (TLS)
- Tidal Processing and Analysis
- Digital Photogrammetry
- Satellite Positioning II

These technical subjects offer exposure to field instruments, modern surveying techniques, and advanced data processing

Academic Experience at UTM

1. **Balanced Theory and Practice**
   UTM provides a well-balanced combination of theoretical learning and practical applications. Students not only study concepts in class but also gain hands-on experience directly using instruments and survey equipment.

2. **Comprehensive Laboratory Facilities**
   The university offers fully equipped labs for geospatial engineering. Students are allowed and encouraged to use these facilities to improve their technical competence and instrument-handling skills

3. **Exposure to New and Specialized Courses**
   Courses such as Industrial Survey and Terrestrial Laser Scanning are not commonly offered at ITB, making them a valuable and exclusive learning experience. These subjects emphasize practical sessions that develop both technical understanding and applied skills.

4. **Learning Structure**
   Assignments commonly include:
   - Literature reviews
   - Case studies based on real-world situations

   This approach trains students to conduct independent learning and understand how geospatial knowledge is applied professionally

5. **Examination System**
   The assessment structure at UTM typically consists of:
   - Only a Final Exam (UAS)
   - No Midterm Exam (UTS)
   - A one-week mid-semester break to allow students to rest and reset

   The learning environment remains relaxed and supportive. Lecturers are approachable, friendly, and easy to communicate with, while students maintain respect and professionalism.

Social & Cultural Experience

1. **Language and Communication**
   Malay is the primary language used in Malaysia, which makes communication easier for Indonesian students. Adapting to the local language and daily interactions is relatively seamless, both on campus and in the community.

2. **Food and Cost of Living**
   Malaysian cuisine is similar to Indonesian food, with additional Chinese and Indian influences.Food is affordable, especially around campus:
   - Canteen (near dormitory): RM 4.5 (~Rp 18,000) for rice and chicken
   - Most restaurants: RM 8–15 (Rp 32,000–60,000)

   Because the cuisine is familiar, students do not need major adjustments in food preferences.

3. Student Community and Activities

- Student life at UTM is enjoyable, with many opportunities to socialize and interact with both local and international students. Students in UTM are generally friendly, welcoming, and enthusiastic when meeting exchange students
- Lecturers and peers often show curiosity and interest when they find out that a student is from Indonesia, making the environment even more supportive
- A unique aspect of studying in Malaysia is the pre-university system, meaning many local students start university later and are therefore older
- As a result, exchange students from Indonesia may feel like the youngest in the class despite taking third-year subjects.

IUP Students Experiences

Technische Universität Hamburg (TUHH)

About TUHH

TUHH (Technical University of Hamburg), founded in 1978, is known for engineering excellence, international collaboration, and its innovative learning environment. Hamburg's global atmosphere makes it an ideal location for students in engineering and environmental sciences.

Academic Information

- Faculty : Civil Engineering
- School : Geo-Hydroinformatics
- Credits Earned : 25 ECTS (~17–18 SKS)

Sample Courses Taken:

- Emerging Trends in Environmental Engineering
- Introduction to Climate-Informed Engineering (GNSS & Remote Sensing Applications)
- Geo-Information Systems in Water Management and Hydraulic Engineering
- Advanced Topics in Management, Organization, and Human Resource Management
- Chinese I1
- German A1.1

These courses offer a mix of technical skills, interdisciplinary knowledge, and language development.

Academic Experience at TUHH

1. **Balanced Learning Culture**
   The learning system combines instructor-led explanation with strong expectations for student independence. Following German academic culture, lecturers treat students as adults who understand their responsibilities and manage their own learning process.

2. **Flexible Course Selection**
   TUHH allows flexibility in choosing courses, including language classes designed specifically for international students. This helps students integrate more easily into the academic and social environment.

3. **Examination Structure**
   Only one final exam is held at the end of the semester. The mid-semester period is mainly used for:
   - Reviewing previously learned material
   - Preparing submissions
   - Registering for examination

4. **Interactive Learning Environment**
   At the end of each lecture, instructors allocate time for open Q&A and provide step-by-step tutorials before assigning exercises. This allows students to gradually build understanding of complex topics.

5. **Laboratory Visits & Research-Based Tasks**
   Students participate in laboratory visits to observe workflows and learn how research facilities operate. Most courses focus on:
   - Research output
   - Scientific writing
   - Presentations

   These components strengthen academic communication and report-writing skills essential in professional and scientific settings.

Social & Cultural Experience

1. **Language and Communication**
   While Hamburg is an international city, daily communication still relies heavily on German. International students may experience language barriers, but locals are generally willing to switch to English once they recognize a newcomer.

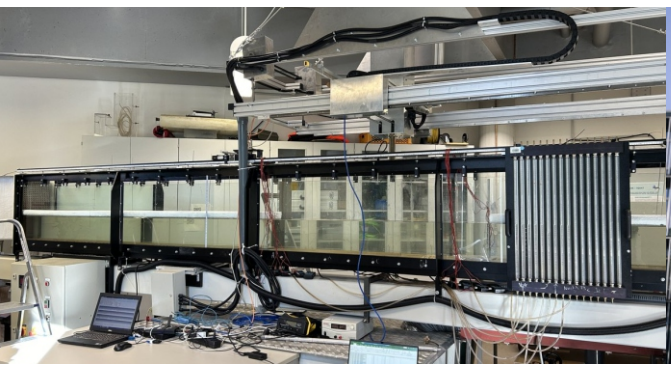
2. **Social Interaction and Local Culture**
   - Do not hesitate to start a conversation—Germans may appear serious or distant, but they are polite and open once approached respectfully
   - Timing matters; interactions are easiest in shared living spaces or communal areas
   - Germans value rules and structure, yet they remain friendly, open minded, and appreciative of polite communication

3. **Supportive and Cooperative People**
   Locals are highly cooperative. When a student faces difficulties, people are usually eager to help. Refusing assistance may even be interpreted as dismissing their goodwill.

4. **Muslim-Friendly and Indonesian Community**
   Hamburg has a strong Muslim population and a large Indonesian student community (PPI Hamburg). Students can easily find:
   - Halal restaurants (especially Turkish eateries)
   - Turkish/Arab grocery stores
   - Indonesian products near Hamburg Hauptbahnhof
   - There is no discrimination against Muslims, making the city comfortable and welcoming

5. **Cost of Living**
   Estimated expenses:
   - Monthly groceries: €10–€30 (if cooking at home)
   - Eating out at halal restaurants: €4–€10
   - University canteen (Mensa): €2–€5
   - Mensa provides the cheapest and most reliable daily meals

6. **Networking and Community Activities**
   Through ESN (Erasmus Student Network), students meet peers from:
   - HAW Hamburg
   - University of Hamburg (UHH)
   - HFBK Hamburg
   - ESN regularly organizes events for international students, offering opportunities to build global networks and long-lasting friendships.



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