RESOURCES FOR THE FUTURE
THE UNIVERSITY OF RESOURCES. SINCE 1765.
an overview of the Mining Academy

THE UNIVERSITY OF RESOURCES. SINCE 1765.
an overview of the Mining Academy

THE UNIVERSITY OF RESOURCES. SINCE 1765.

university in the service of sustainable materials and energy along the raw materials supply chain
  - from the exploration of new and domestic deposits
  - to the development of alternative energy technology, recycling
  - to the research of new materials
  - with the national mission of securing raw materials – with a worldwide network
an overview of the Mining Academy

PROFILE

- **founded in 1765** – oldest mine science university, celebrates its 250th anniversary in 2015
- **clear profile** GEOSCIENCES – MATERIALS – ENERGY – ENVIRONMENT
- **top research university**: university with the most external funds in the new German states (ca. 64 million euros in 2014)
- **scientific location Freiberg**: Helmholtz Institute Freiberg for Resource Technology (HIF)
- **specials**
  TU Bergakademie Foundation, Krüger Foundation, terra mineralia – the university’s unique endowment collection, own teaching and research mine
- **campus university** – short distances
an overview of the Mining Academy

FACTS AND FIGURES

- **6** Faculties
- **10** central facilities
- **40** institutes

- **64** courses of study
- **1,398** freshmen
- **4,927** students

- **64** Million € in external funds in 2014
- **88** professors
- **2,288** university employees
an overview of the Mining Academy

FOUNDATIONS

- Technische Universität Bergakademie Freiberg Foundation
- Dr. Erich Krüger Foundation
- Pohl-Ströher Mineral Collection
- “Mineralogical Collection Germany” Foundation
- FME Endowment for the support of teaching and research at the Institutes for the History of Science and Technology
- External foundation: Sparkasse “TU Bergakademie Freiberg” Foundation
COLLECTIONS – SCIENTIFIC TREASURES

- terra mineralia (endowment collection)
- geoscience collections
- model collection of mine and metallurgy machines and equipment
- collection of mathematical instruments and models
- engineering collections
- art and cultural heritage, visitors’ gifts
TERRA MINERALIA – MOST IMPORTANT MINERAL COLLECTION WORLDWIDE

- exhibition of the Pohl-Ströher Mineral Collection at the TU Bergakademie Freiberg
- exhibition of over 5000 minerals, precious stones and meteorites from five continents
- since 2012 Mineralogical Collection Germany in KRÜGERHAUS
250 YEARS OF HISTORY

foundation of the Bergakademie
21 November

first university laboratory established by Prof. Lampadius

right to confer doctorates

1765

right to confer habilitation

1771

foundation of the Krüger Endowment

1796

opening of terra mineralia in Freudenstein Castle

1920

university reformation

1927

right to name "Technische Universität"

1989 -92

foundation of the Institute of Resource Technology

1993

2006

2008

2011

2012

first foreign student: Albert Vergeel, Holland, registers

foundation of the World Forum of Resource Universities

TU Bergakademie Freiberg | 2016 |
-BERGAKADEMIE 250 YEARS OLD

celebration year: 5th March 2015 – 3rd May 2016

Friedrich Anton von Heynitz and Friedrich Wilhelm von Oppel
co-founder of the Mining Academy
FAMOUS STUDENTS AND PROFESSORS

- Michail Wassiljewitsch Lomonossow (1711-1765)
  Russian polymath

- Abraham Gottlob Werner (1749-1817)
  most important teacher at the Bergakademie

- Alexander von Humboldt (1769-1859)
  natural scientist, polymath

- Friedrich von Hardenberg (Novalis) (1772-1801)
  Romanticist

- August Wilhelm Lampadius (1772-1842)
  inventor of illuminating gas
History: Milestones and personalities

Famous Students and Professors

- **Ferdinand Reich** (1799-1882)
  discoverer of indium

- **Hieronymus Richter** (1824-1896)
  discoverer of indium

- **Julius Weisbach** (1806-1871)
  inventor of theodolites

- **Clemens Alexander Winkler** (1838-1904)
  discoverer of germanium

- **Adolf Ledebur**, (1837-1916)
  famous metallurgist

- **Karl Kegel** (1876-1959)
  developed the process of brown coal briquetting
PERSONALITIES OF INTERNATIONAL STANDING

1711-1765
Michail Wassiljewitsch Lomonossow
Russian polymath, 1739 – 1740 student in the laboratories of mining councilor Johann Friedrich Henkel

1769-1859
Alexander von Humboldt
natural scientist and humanist, studied geology with Abraham Gottlob Werner

1765
1739
1769
1791
1873

1749-1817
Abraham Gottlob Werner
most important teacher at the Mining Academy; considered as the originator of the science of the structure and composition of the earth’s crust

1838-1904
Clemens Winkler
from 1873 on professor of chemistry at the Mining Academy, 1886 discovery of germanium
studying at the TU Bergakademie Freiberg

STUDYING AT THE TU BERGAKADEMIE
OVERVIEW OF STUDIES

1 campus university

32 % female students

64 courses of Study

4,927 students, of whom 80 % are in MINT

1,398 freshmen

84 € semester fee
studying at the TU Bergakademie Freiberg

MATHEMATICS, INFORMATICS, NATURAL SCIENCES

- Applied Informatics (B)
- Applied Mathematics (D)
- Network-Computing (M)
- Business Mathematics (B, M)

- Applied Natural Sciences (B, M)
- Chemistry (B, M, D)
- Photovoltaic and Solid-state Technology (M)
studying at the TU Bergakademie Freiberg

GEOSCIENCES AND GEOENGINEERING

- Advanced Mineral Resources Development (M)
- Geoinformatics/Geophysics (B, M)
- Geology/Mineralogy (B)
- Geosciences (M)
- Geoecology (B, M)
- Geotechnology/Mining (D)
- Surveying and Applied Geodesy (D)
- Groundwater Management (English Language Master)
studsing at the TU Bergakademie Freiberg

ENGINEERING

- Computational Materials Science (English Language Master)
- Ceramics, Glass and Construction Materials Engineering (D)
- Engineering & Computing (M)
- Mechanical Engineering (D, B, M)
- Technology Management (M)
- Environmental Engineering (B, M)
- Environmental Process Engineering (D, postgraduate program)
- Process Engineering (D, B, M)
studying at the TU Bergakademie Freiberg

ENGINEERING

- Electronics and Sensor Materials (B, M)
- Automobile Engineering: Materials and Components (B, M)
- Foundry Technology (B)
- Materials Science and Materials Technology (D)
ECONOMIC SCIENCES

- Business Administration (B, M)
- Business and Law (B)
- Business Administration in Energy and Resources Management (D)
- Energy and Resource Management (M)
- Management and Technology (M)
- Industrial Engineering and Management (B, M)
- International Business of Developing & Emerging Markets (MBA)
- International Management of Resources and Environment (MBA)
studying at the TU Bergakademie Freiberg

INTERDISCIPLINARY – CONNECTING ARTS, SCIENCES, AND ENGINEERING

- Industrial Archaeology (B, M)
- Industrial Culture (M)
studying at the TU Bergakademie Freiberg

## DEGREES WITH PERSPECTIVES

<table>
<thead>
<tr>
<th>Degree</th>
<th>Duration</th>
<th>Perspectives</th>
</tr>
</thead>
</table>
| Diploma     | 8, 9, 10 Semesters | Diploma in Engineering  
Diploma in Natural Sciences  
Diploma in Industrial Engineering |
| Bachelor    | 6, 7 Semesters | Bachelor of Science                              |
| Master      | 4 Semesters | Master of Science  
Master of Business Administration |
studying at the TU Bergakademie Freiberg

DEGREES: BACHELOR, MASTER*

- first degree qualifying for a profession after 6 to 7 semesters
- transmits scientific basics as well as social and methodical competence

Bachelor

- demanding advanced course of studies for 3 to 4 semesters
- a prior degree qualifying for a profession is required
- high level of technical and scientific expertise
- entitlement to doctoral studies

Master

*Bologna Declaration of 1999 on the creation of a uniform European educational area
THREE WAYS TO THE GOAL: BACHELOR AND MASTER

options of the two level degree system
studying at the TU Bergakademie Freiberg

**DEGREE: DIPLOMA**

usual period of study: 9 or 10 Semesters

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**Basic Study Period**
1. – 4. Semester

- mathematic, natural scientific, and subject-specific basics

**Main Study Period**
5. – 9., 10. Semester

- field of study / concentration
- internship (7th semester)
- Final Examination / Diploma Thesis
- Independent Scientific Working
- Access to Doctoral Studies

---

**Intermediate Diploma**

**Diploma**
studying at the TU Bergakademie Freiberg

**LINKED AND NETWORKED – CONTACTS WORLDWIDE**

university cooperation with 32 universities all over the world

contact to 215 more universities in 50 countries

- Butte
- Calgary
- Carbondale
- Chicago
- Golden
- New York
- Pittsburg
- Potosi
- Preto
- Rapid City
- Rolla
- St. Paul
- Waterloo
- Gliwice
- Harbin
- Sofia
- Krakau
- Kreta
- Kosice
- Leoben
- Marne-la-Valée
- Metz
- Miskolc
- Moskau
- Ostrava
- Prag
- Trento
- Trondheim
- Beijing
- Dneprope-trovsk
- Hanoi
- Petrozavodsk
- Priština
- Kiew
- St. Petersburg
- Tirana
- Ulan Bator
- Vezprem
- Wuhan
**ONE PROGRAMME, TWO DEGREES**

**bi-national programmes**

<table>
<thead>
<tr>
<th>Country</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Wuhan University of Science and Technology, University of Geosciences Beijing</td>
</tr>
<tr>
<td>Frankreich</td>
<td>École du pétrole et des Moteurs Rueil Malmaison, Université de Marne la Vallée, Université Paris Est Créteil (UPEC), Université de Savoie à Chambéry</td>
</tr>
<tr>
<td>Ghana</td>
<td>Kwame Nkrumah University of Science and Technology</td>
</tr>
<tr>
<td>Italien</td>
<td>University of Trento</td>
</tr>
<tr>
<td>Polen</td>
<td>AGH Krakau, TU Gliwice, Wirtschaftsuniversität Poznan</td>
</tr>
<tr>
<td>Russland</td>
<td>Bergbauuniversität St. Petersburg, Technische Universität für Stahl und Legierungen Moskau „MISiS“, Universität für Erdöl und Erdgas „Gubkin“, Universität für Geologische Erkundung, Kasaner Föderale Universität</td>
</tr>
<tr>
<td>Thailand</td>
<td>Universität für Geologische Erkundung</td>
</tr>
<tr>
<td>Tschechien</td>
<td>Universität für Chemie und Technologie Prag, TU VŠB Ostrava</td>
</tr>
<tr>
<td>Ungarn</td>
<td>Universität Miskolc, Central European University Budapest (CEU)</td>
</tr>
<tr>
<td>Ukraine</td>
<td>Nationale Metallurgische Akademie der Ukraine Dnepropetrovsk, Pridniprovskva Staatliche Akademie für Bauwesen und Architektur Dnepropetrovsk</td>
</tr>
</tbody>
</table>
921 (17 %) from all over the world

Europe 182
Asia 547
Latin America 106
North America 7
Africa 78
Australia 1
International Students

TOP 10

- China: 39%
- Brasilien: 13%
- Indien: 9%
- Russland: 8%
- Vietnam: 6%
- Ukraine: 6%
- Pakistan: 5%
- Iran: 6%
- Syrien: 3%
- Polen: 5%
- Pakistan: 5%
“DEUTSCHLANDSTIPENDIUM” (national scholarship) FOR DEDICATED STUDENTS

- support for talented students and applicants
- criteria: achievement and social involvement
- 300 € per month:
  - 150 € from the state,
  - 150 € from private sponsors
- 2014
  - 93 scholarships
  - 30 sponsors
studying at the TU Bergakademie Freiberg

ORIENTATION AND SUPPORT

- information events
  - Open Days
  - Juniors‘ University
  - Night Laboratory
  - lectures in chemistry for pupils
  - spring mathematics academy
  - Science Night
- central and subject-specific student counseling
- International University Center
- BAföG counseling
- Career Service
PUPILS CHECK OUT THE UNIVERSITY

university for pupils during school vacations – getting to know the programs in different fields of study

- Geoscience projects
- Informatics week
- MINT week
- Technology week
- Materials projects
- Industrial archaeology project

information at:
http://tu-freiberg.de/schueleruni
FROM UNIVERSITY STUDIES TO PROFESSION

- contact for

... students and graduates entering their profession

<table>
<thead>
<tr>
<th>training of interdisciplinary competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>applications / career entry</td>
</tr>
<tr>
<td>soft skills</td>
</tr>
<tr>
<td>IT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>individual counseling</th>
</tr>
</thead>
<tbody>
<tr>
<td>competence analysis</td>
</tr>
<tr>
<td>checking over applications</td>
</tr>
<tr>
<td>practising job interviews</td>
</tr>
</tbody>
</table>

... employers support in the search for young professionals

<table>
<thead>
<tr>
<th>dialog with employers</th>
</tr>
</thead>
<tbody>
<tr>
<td>company contact fair</td>
</tr>
<tr>
<td>Freiberg career discussions</td>
</tr>
<tr>
<td>job portal</td>
</tr>
</tbody>
</table>

contact
Career Center
Prüferstr. 1a
Tel.: 03731 39-3303
tu-freiberg.de/career

studying at the TU Bergakademie Freiberg
research for the future

EXCELLENCE IN RESEARCH AND TEACHING
research for the future

INTERDISCIPLINARY TOP RESEARCH

4 profile segments GEOMATENUM

6 Faculties
2 special research areas

2 DFG focal points program

1 advanced technology cluster

1 Resource Technology Institutes of the Helmholtz-Gemeinschaft

64 Million € in external funding in 2014
research for the future

PROFILE SEGMENTS GEOMATENUM

GEOSCIENCES
exploration and extraction of raw materials

MATERIALS
materials for the solid-state industry, development of new materials

ENERGY
energy sources and technology

ENVIRONMENT
sustainability, resources
## ACADEMIC PROFILE

<table>
<thead>
<tr>
<th>fields</th>
<th>academic disciplines</th>
<th>raw materials supply chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics / Natural Sciences</td>
<td>Engineering</td>
<td>Business Administration</td>
</tr>
<tr>
<td>GEOSCIENCES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATERIALS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENERGY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENT</td>
<td>Characterization Simulation Modeling Visualization Synthesis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Machines Plants Processing Technologies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Innovation Management Economy / Ecology Value Creation</td>
<td></td>
</tr>
</tbody>
</table>

Faculty 1: Mathematics and Informatics - Faculty 2: Chemistry and Physics - Faculty 3: Geosciences, Geotechnology, Mining - Faculty 4: Mechanical Engineering, Processing and Energy Technology - Faculty 5: Materials and Material Technology - Faculty 6: Business Administration
research for the future

## FACULTIES

<table>
<thead>
<tr>
<th>Fac.</th>
<th>Faculty Name</th>
<th>Number of Institutes</th>
<th>Number of Professors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fac. 1</td>
<td>Faculty of Mathematics und Informatics</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Fac. 2</td>
<td>Faculty of Chemistry and Physics</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Fac. 3</td>
<td>Faculty of Geosciences, Geotechnology and Mining</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Fac. 4</td>
<td>Faculty of Mechanical Engineering and Processing and Energy Technology</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>Fac. 5</td>
<td>Faculty of Materials and Material Technology</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Fac. 6</td>
<td>Faculty of Business Administration</td>
<td>1</td>
<td>15</td>
</tr>
</tbody>
</table>
RESEARCH SUBJECTS: GEOSCIENCES

Tectonic Physics
Mineral Synthesis
Seismology and Geoelectricity
Mining – Open Pit and Underground
Deep Drilling Technology and Geofluids
Soil and Rock Mechanics
Surveying and Geodesy
Atmospheric and Regional Climate Research
Paleontology
Geoinformatics and Geomathematics
Civil Engineering and Concrete Technology
Hydro and Environmental Geosciences
RESEARCH SUBJECTS: MATERIALS

Materials Production
Materials Processing
Materials Science
High Temperature Materials
Material Finishing
Material Recycling
Lightweight Construction
Ceramics
Glass
Use of Materials
Ultrapure Substances
Solid-State Materials
RESEARCH SUBJECTS: ENERGY

Coal Gasification
Biomass Gasification
Synthesis Gas
Polygeneration
Integrated Gasification Combined Cycle, IGCC
Carbon Capture and Storage, CCS
Crude Oil Processing
Partial Oxidation
Flame Modeling
Pyrolysis
Process Simulation
Energy Efficiency
RESEARCH SUBJECTS: ENVIRONMENT

Atmospheric Chemistry
Biodiversity Research
Soil Research (erosion, fertility,...)
Geoecology
Circular Flow Economy and Recycling
Surface and Groundwater Research
Ecological System Research
Regenerative Energies and Geothermal Energy
Regional Climate Research
Environmental Microbiology
Environmental Processing Technology
Environmental Economics and Law
Chemicals and Evaluation of their dangers and risks
LARGE SCALE PLANT TECHNOLOGY

exploration

extraction

preparation

processing/refining

recycling
LARGE RESEARCH PROJECTS

special research fields

SFB 799 „TRIP-MATRIX-COMPOSITE“
new composites of ceramics and steel
DFG Special Research Field

SFB 920 multifunctional filters for molten metal filtration – a contribution to zero defect materials, DFG Special Research Field

BMBF Center for Innovation Competence

modeling of conversion processes
ZIK Virtuhcon / SMWK
LARGE RESEARCH PROJECTS

DFG Focal Point Program

SPP 1418 FIRE – “Initiative for the reduction of emissions” - focal point program to develop environmentally friendly fireproof substances

BMBF Program - Top research and innovation in the new states”

Deutsches EnergieRohstoff-Zentrum Freiberg (DER) Technologies for the post-oil era

BMBF-sponsored Innovation Initiative - “Companies in the region of the new states”

Innovation forum - “Innovative integration of brown coal in Central Germany” ibi
LARGE RESEARCH PROJECTS

Saxony's Initiative for Excellence
ADDE Research Cluster: functional structural design of new high-performance materials through atomic design and defect engineering

Interdisciplinary Networks
The German Fuel Institute DBI | bergakademie national scientific and technological center for fuel and coal use with reduced levels of CO₂.
WORLD FORUM FOR SUSTAINABILITY

11 June 2012: founding event in Freiberg, by 80 resource universities from 50 countries

goals

- responsibility for a new awareness of raw materials: principle of sustainable development
- education: sustainability-oriented minimum standards in teaching and training
- international exchange for unlimited access to knowledge and experience through global networks and suitable platforms

THE APPEAL OF A RESOURCE PROFILE

- position as key university for Russia, Central Asian and South American raw materials countries, including

- German-Russian Resource University
  (initiators: TU BAF + Mining University St. Petersburg)
  - raw materials cooperation in the German-Russian raw materials forum
  - International University of Resources IUR: new program “Advanced Mineral Resources Development”
  - Double Degree / Joint Degree
  - Domeyko Center (Chile)
  - Lomonossow House

- International Master’s programs
- “Professional School” for international experts and leaders
COMPETENCE CENTERS

at the TU Bergakademie
- Biohydrometallurgy Center for Strategic Elements
- German Energy Raw Materials Center Freiberg DER
- DBI Bergakademie – Bundling Energies in the German Fuel Institute
- Excellence Center for Energy – German Center for Gasification Technology (DeZeV)
- Geothermal Research Center (GRC)
- High Pressure Research Center (FHP)
- Interdisciplinary Ecologic Center IÖZ
- Interdisciplinary Competence Center for Land Recycling CiF e.V.
- Center for Innovation Competence Virtuhcon

outside the university
- Geocompetence Center Freiberg e.V.
- Technology Center for Solid-State Materials THM
research for the future

SCIENCE AND BUSINESS

industrial cooperation, e.g.
- focal point university Thyssen Krupp AG
- focal point university RWE

cooperation with research facilities, e.g.
- Helmholtz Centers (especially HIF)
- Fraunhofer Institutes
- Leibniz Institutes
- Federal Institute for Geosciences and Raw Materials (BGR)

international connections, e.g.
- German-Russian Raw Materials Forum
- International University of Resources IUR
FOR TOMORROW’S TOP RESEARCHERS

- interdisciplinary scientific facility
- umbrella organization for doctoral candidates in all subjects
- counseling and further training in interdisciplinary competence areas
- promotion of multifaceted personality development
- promotion of speedy completion of doctoral studies
- promotion of self-sufficiency and responsibility in the doctoral candidates
campus and university city

CAMPUS AND UNIVERSITY CITY
Karl Kegel Building

campus and university city
campus and university city

New Cafeteria on the campus
about 1000 dorm rooms are available directly on campus in the dormitories of Studentenwerk Freiberg
historic main building of the university at Akademiestraße 6
The rector’s office and the student administration are in the building.
campus and university city

Julius Weisbach Building for the Faculty of Mechanical Engineering and Processing and Energy Technology
DBI Building - “Reiche Zeche”
laboratory at the Institute for Energy Processing Technology and Chemical Engineering
professor for Electrotechnology at the Faculty of Mechanical Engineering and Processing and Energy Technology
ultra-clean room at the Faculty of Chemistry and Physics
Technikum for Machine and Processing Development at the Faculty of Mechanical Engineering and Processing and Energy Technology
Stratigraphical Collection, Humboldt Building
Mineralogical Collection, Werner Building
terra mineralia, endowment collection at the TU Bergakademie displayed in Freudenstein Castle, Freiberg
science in the heart of the city – presented during the Night of Science and Business
campus and university city

KRÜGERHAUS
“Mineralogical Collection Germany”
Research and Teaching Mine
Campus “Reiche Zeche”
Race Technology Team – one of the top five in the world in the international competition Formula Student 2014
facts and figures

development in the number of students from winter semester 05/06 till winter semester 14/15
facts and figures

students according to area of study in winter semester 2014/15
Background of the students in winter semester 2014/15

- Saxony: 50%
- Former West Germany (incl. Berlin): 20%
- Other new federal states of Germany: 15%
- Foreign countries: 15%
total external funding at the TU Bergakademie in Million €
federal financing of the university

2013

2014

TU Bergakademie Freiberg | 2016 |
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