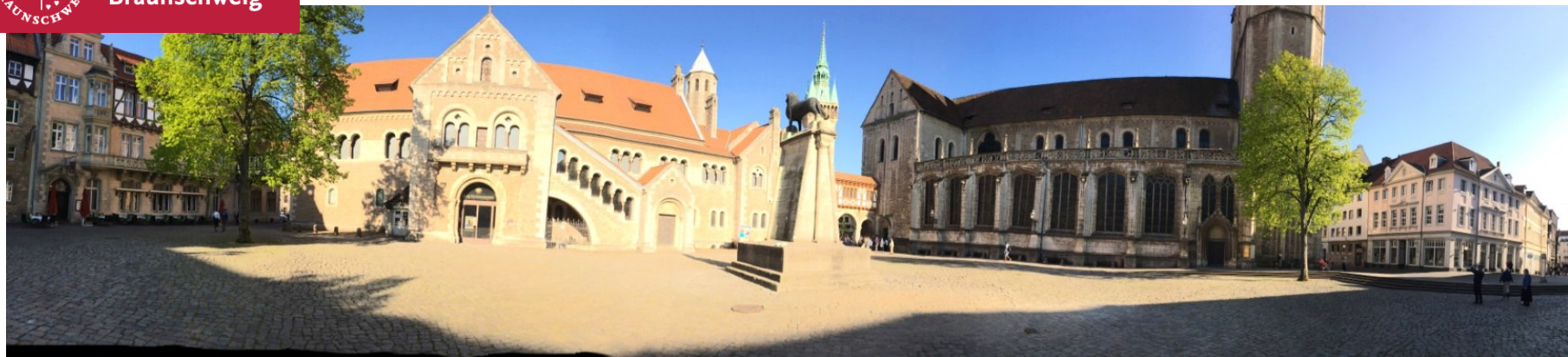




Technische
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Welcome to Data Science @ TU Braunschweig!

www.tu-braunschweig.de

Data Science @ TU Braunschweig



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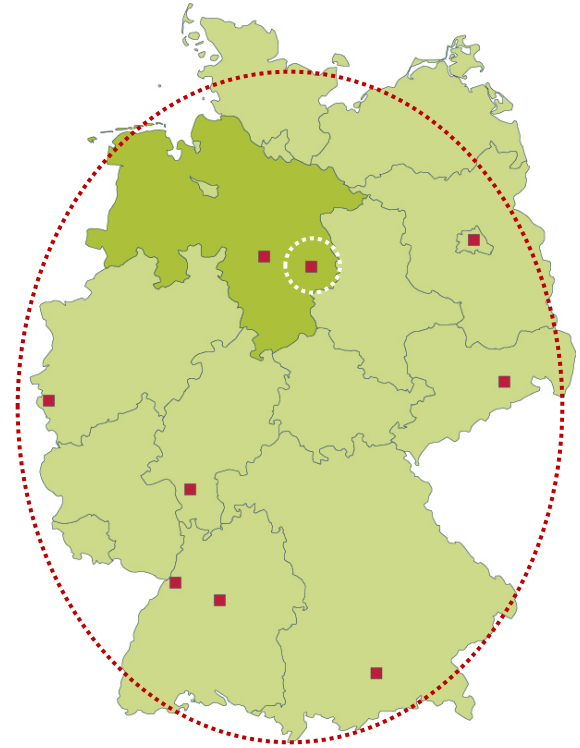
Technische Universität Braunschweig

84 Study Programms
3.600 First Year Students
18.500 Students

120 Institutes
2.300 Researchers
3.800 Total Staff



Europe's Most Active Research Area



Data Science - Relevance

- **Bitkom e.V.** Study of 2015
 - 48% of all companies generate value from data analyses.
 - 59% of all companies complain about the lack of data analysis specialists.
 - The added value of data analysis extends over all phases of the value chain.

- **Simple Message:**



- **Harvard Business Review: Data Scientist is the Sexiest Job of the 21st Century!**

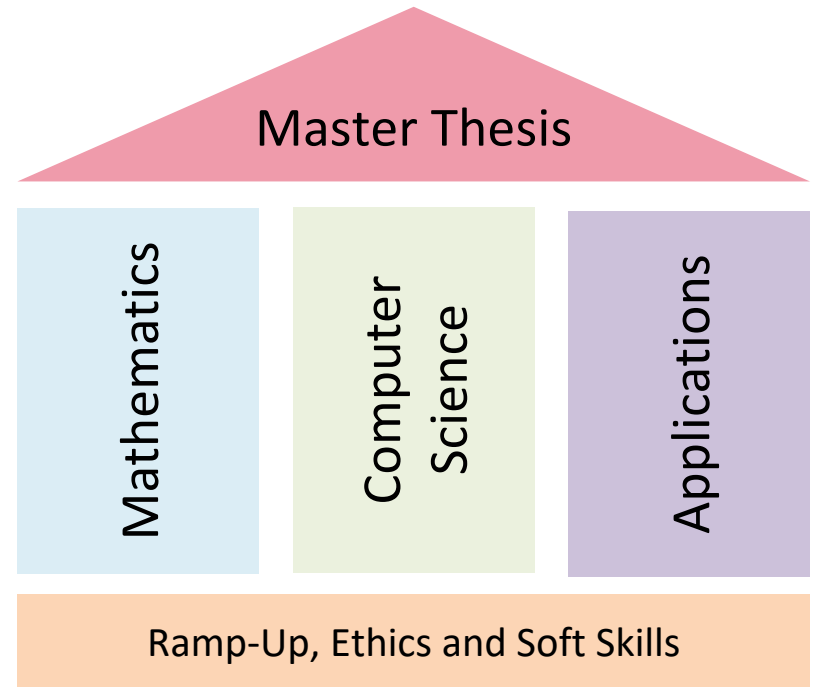
Skills and Competencies

- Graduates as **Master of Data Science** can
 - Use Methods of Data Acquisition, Data Integration and Data Management efficiently
 - Select Analysis Methods competently and adapt it to the Special Requirements of an Application
 - Evaluate and assess the Expressiveness of Analysis Methods and Results
 - Lead Data Projects in Companies and effectively manage Corporate Decision Processes

- **Simply: Data Science = Mathematics + Computer Science + Applications**

Structure of Data Science Programme (120 Credits)

- 3 Core Areas:
 - 25 Credits **Mathematics**
 - 25 Credits **Computer Science**
 - 15-25 Credits **Applications**
- Application Areas
 - Biology, Chemistry, Pharmacy
 - Medicine
 - Engineering
 - Image and Signal Processing
- Mandatory seminar and lab courses
- Optional research project



Modules in Mathematics Core

- **Optimization:** Discrete Optimization, Dynamic Optimization, Polynomial Optimization, Optimization in Machine Learning, ...
- **Statistics:** Statistical Learning, Risk and Extreme Value Theory, Non-parametric Statistics, Time Series Analysis, ...
- **Numerics:** Model Reduction, Numerical Analysis and Learning from Data, ...
- **Applied Analysis and Algebra:** Inverse Problems, Computer Algebra, Machine Learning with Neural Networks, ...

Modules in Computer Science Core

- **Algorithmics:** Online Algorithms, Approximation Algorithms, Computational Geometry, ...
- **Machine Learning:** Foundations of Machine Learning, Pattern Recognition, Machine Learning for IT-Security, Deep Learning Lab, ...
- **Databases and Information Systems:** Data Warehousing and Data Mining, Information Retrieval und Web Search Engines, Knowledge-based Systems, ...
- **Software Engineering:** Software Architecture, Software Quality, Python Lab, Project Management, ...
- **Distributed Systems:** Cloud Computing, Replication and Consistency, ...

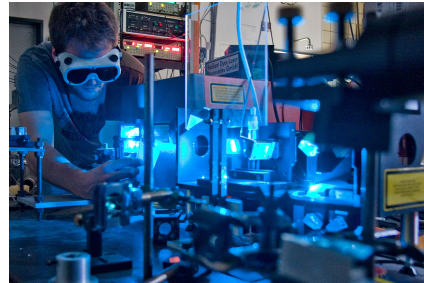
Application Areas

- **Biology, Chemistry and Pharmacy:** Network Biology, System Biology, Immune Metabolism, Bioinformatics, Theoretical Chemistry, Chemometrics, ...
- **Medicine:** Biomedical Data Analysis, Introduction to Medicine, Health-Enabling Technologies, ...
- **Data Science in Engineering:** Deep Learning for Remote Sensing, Coastal Engineering, Automotive Software Engineering, Railway Timetabling, Fundamentals of Turbulence Modeling, Ecological Modeling,
- **Image and Signal Processing:** Speech Dialogue Systems, Mathematical Image Processing, Digital Signal Processing, Computer Vision and Machine Learning, Deep Learning for Quantum and Nano Science, ...

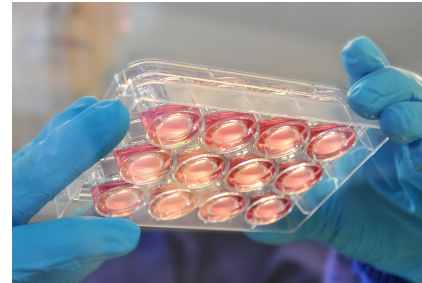
Core Research Areas @ TUBS



Mobility



Metrology



**Infections &
Therapeutics**



Future Cities

Application and Admission

- Typical entry requirements: Bachelor in Computer Science or Bachelor in Mathematics
- If sufficient previous knowledge of Computer Science or Mathematics, then also related Bachelors in Physics, Engineering, Economics etc.
- Either admission via Mathematics Track (RampUp Computer Science) or via Computer Science Track (RampUp Mathematics)
- English language certificate (B2/C1)
- Online Admission Interview
- Application Deadline: 15 July 2021

Admission via Computer Science Track

At least 60 CP in Computer Science and at least 15 CP in Mathematics, including knowledge in the following areas:

- Programming
- Software Engineering
- Databases
- and at least 2 of the following: Computer Networks, IT Security, Distributed Systems

Then mandatory Mathematics Ramp Up Module.

Admission via the Mathematics Track

At least 75 CP in Mathematics and of which there may be 15 CP in Computer Science, including knowledge in the following areas:

- Linear Algebra
- (Multi-variate) Analysis
- Programming Skills

Then mandatory Computer Science Ramp Up Module.

Language Requirements

If not an English native speaker, or an undergraduate programme in English, a language certificate not older than 3 years is required:

| Englishtest | Mindestleistung |
|--|---|
| Test of English as a Foreign Language (TOEFL), internetbasierter Test/IBT www.ets.org | 95 Punkte |
| Cambridge English: Advanced (CAE) www.cambridgeenglish.org | Grade B oder höher |
| Cambridge English: Proficiency (CPE) www.cambridgeenglish.org | Grade C oder höher |
| International English Language Testing System (IELTS) www.ielts.org | Band 6,5 oder höher |
| Sprachzeugnis (English Language Proficiency Report) des Sprachenzentrums der TU Braunschweig. | Mindestens zwei Fertigkeiten auf dem Niveau B2 und zwei Fertigkeiten auf dem Niveau C1, Sprachenzentrum (English Language Proficiency Report) |

TU BS Language Center still offers language tests in June: Contact Sándor Fekete for arrangements.

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More Information at <https://www.tu-braunschweig.de/en/study-teaching/beginning-your-studies/degree-programmes/data-science-master>

or email to ds-studium@tu-braunschweig.de