Elite Master Program

MSc Data Science

LMU München
Data Science@LMU

Spokespersons
Prof. Dr. Göran Kauermann (Statistics)
Prof. Dr. Thomas Seidl (Informatics)

Vice-Spokesperson
Prof. Dr. Matthias Schubert (Informatics)

Coordinators & Contact
Dr. Constanze H. Schmaling / Dr. Michael Windmann
Data Science: What is it about?

Data Science combines **informatics** and **statistics** in order to extract information from real data.

“Data Science is a blend of Red-Bull-fuelled hacking and espresso-inspired statistics”

*(Mike Driscoll, CEO Metamarket)*
Data Scientists: What do they do?

Data Scientists: What do they do?

- Retrieve information from data
- Deal with data confidentiality
- Use statistical models
- Apply machine learning tools
- Communicate the results

Why Data Science? Why LMU?

• Data Science is "data driven problem solving"

• Data Scientists are needed in industry, business, and science

• Data Science requires computational as well as statistical knowledge and skills

• At LMU Munich, Statistics and Informatics are in the same faculty
MSc Data Science@LMU

• Since winter semester 2016/17
• One of the first international Data Science programs
• Supported by the Elite Network of Bavaria
• Small cohorts – individual support
Curriculum
1st Semester | 30 ECTS
Statistics
12 ECTS
Informatics
12 ECTS
Fundamentals of Data Science | 12 ECTS
Human Computation and Analytics
9 ECTS

2nd Semester | 27 - 33 ECTS
Predictive Modelling
6 ECTS

3rd Semester | 27 - 33 ECTS
Data Science Practical
12 ECTS
Data Ethics and Data Security
6 ECTS
Elective Courses
12 ECTS
Current Research in Data Science
9 ECTS

4th Semester | 30 ECTS
Master Thesis and Disputation
30 ECTS

DataScience@LMU
January 2023
1st Semester | 30 ECTS

Statistics

Informatics

Fundamentals of Data Science

Human Computation and Analytics

2nd Semester | 27 - 33 ECTS

Predictive Modelling

3rd Semester | 27 - 33 ECTS

Data Science Practical

Data Ethics and Data Security

Elective Courses

Current Research in Data Science

4th Semester | 30 ECTS

Master Thesis and Disputation
Core Module: Statistics

- Statistical Reasoning and Inference (Foundations)
- Statistical Reasoning and Inference (Advanced level)

Core Module: Informatics

- Knowledge Discovery and Data Mining
- Big Data Management
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Fundamentals of Data Science (Individual Module)

• Heterogeneous level of expertise of incoming students

• Personalised assignment to courses in statistics and informatics to suit individual student’s needs

• Result: homogeneous level of expertise after first semester
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Human Computation and Analytics

- Includes a practical in which students will implement their own concepts for HC/VA systems in the form of a working prototype

Data Ethics and Data Security

- Methodological questions of data anonymisation
- Lecture series with (invited) talks on technical, ethical, and legal aspects of data security
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Statistics
Informatics
Fundamentals of Data Science
Human Computation and Analytics

2nd Semester | 27 - 33 ECTS
Predictive Modelling

3rd Semester | 27 - 33 ECTS
Data Science Practical
Data Ethics and Data Security
Elective Courses
Current Research in Data Science

4th Semester | 30 ECTS
Master Thesis and Disputation
Predictive Modelling

- Theory and algorithms of supervised statistical learning

Elective Modules

- Regular master courses from statistics, informatics, and computer linguistics
- Selected master courses from other departments
- Selected master courses from partner universities, e.g. image processing at TUM
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Current Research in Data Science

• Data Science Summer School
data security and data confidentiality, ethical and legal topics

• Data Science Focused Tutorials
biosciences, e-commerce, networks etc

• Data Science meets Data Practice
lecture series with experts from industry and business

• Field trips
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Data Science Practical

• Supervised practical in the 3\textsuperscript{rd} semester, ca. 2-3 months
• Students work on practical problems in the field of Data Science
• Close cooperation with industry and business partners
• Focus on communicating results and findings to the clients
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Master Thesis and Disputation

- Thesis may be either research-oriented or stimulated through a practical problem
- After submission and assessment → oral defence
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Curriculum – Summary

• Modules **exclusively** for Data Science students

• **Individual Modules** tailored to suit individual student’s needs

• Courses on **data ethics, data confidentiality, and data security**

• Close cooperation with partners in **industry and business** (DS Practicals, Lecture series, ...)

• **Tutorials, Workshops, Summer Schools**
Data Science@LMU Activities and Cooperations

- MSc Data Science
- Data Science Professional Certificate Program
- German Data Science Days
- Data Science Lab
- Munich Center for Machine Learning
- MUDS
- Konrad Zuse School of Excellence in Reliable AI
- AIM@LMU
- Zentrum Digitalisierung Bayern
Local Academic Ties

Universities
- TU München
- Universität Augsburg
- Universität Mannheim

Research Institutes
- Leibniz-Rechenzentrum
- HelmholtzZentrum München
- IAB Nürnberg
- MPI for Innovation and Competition
- Bayerisches Finanz Zentrum
Close Cooperation with Industry and Business
Requirements and Application
Requirements for Application (1/2)

• Students with **excellent knowledge in informatics and statistics**
• Students not interested in specialising in either statistics or informatics
• **Bachelor of Science** (or equivalent) in Statistics or Informatics or related disciplines → at least 180 ECTS (or equivalent)
• **Proficiency in English**
Requirements for Application (2/2)

• **Statistical Science and Data-Based Modelling**
  statistics, data mining, probability theory, and machine learning
  at least 30 ECTS or equivalent

• **Computer Science and Computational Methods**
  data structures and algorithms, database systems, programming
  principles and practice, software engineering
  at least 30 ECTS or equivalent
Application – Step 1: Online Application

Step 1 is successful if

– application is submitted before the deadline
– application documents are complete
– all requirements are fulfilled
– essay is approved by committee

→ Invitation to interview (Step 2)
Application – Step 2: Interview

• 30 minutes, in English
• In person or by video-chat
• Two professors
• Discussion topics see website

→ Assessment of specialised knowledge, mode of expression, conclusiveness of arguments
Application Process – Dates and Deadlines

• Step 1: Online application
  mid-April – 1 June 2023

• Step 2: Interview
  end of June 2023

→ Letters of acceptance are sent out by email in mid-July 2023
General information (for international students) on LMU Munich / Munich

...on the LMU homepage, e.g.

• **Costs/scholarships**

  https://www.en.uni-muenchen.de/students/int_student_guide/before_you_arrive/budgeting/index.html

• **Housing**

  https://www.en.uni-muenchen.de/students/exchange/incomings/austausch_engl/living/accommodation/index.html
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www.datascience-munich.de