

# International Master in Data Analytics

Welcome to Winter Term 2021

Prof. Dr. Dr. Lars Schmidt-Thieme

Information Systems and Machine Learning Lab (ISMLL)  
University of Hildesheim, Germany

October 25, 2021

# Outline

1. About us
2. The Goals of the Data Analytics Program
3. The Structure of the Data Analytics Program
4. Exams and Preparation

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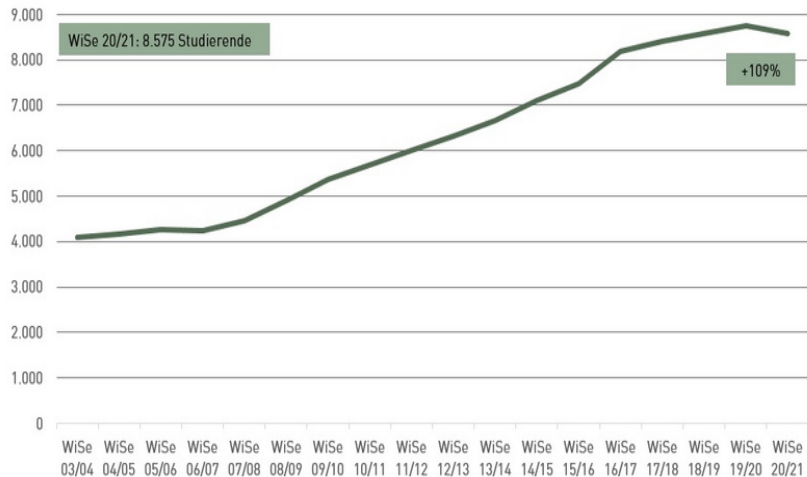
# University of Hildesheim

- ▶ small German research university
  - ▶ 8500 students
  - ▶ 85 professors, 800 employees in research and administration
  
- ▶ with focus on
  1. Educational Sciences,
  2. Cultural Sciences and
  3. Computer Science.
  
- ▶ in the heart of Germany

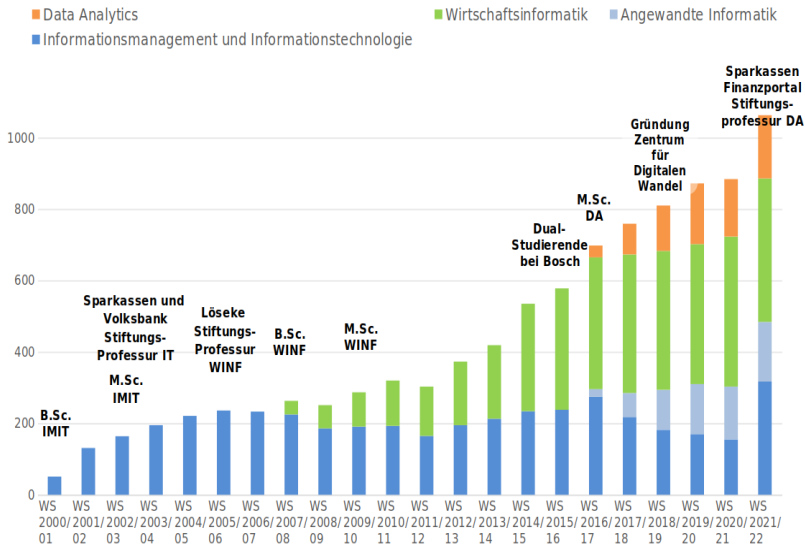
# Students



## Entwicklung der Studierenden (mit Beurlaubten)



# Computer Science Students



# 4 Main University Sites

## Universitätsstandort Hildesheim



**Hauptgebäude Campus** 1  
Universitätsplatz 1

**Forum Neubau** 1  
Universitätsplatz 1

**Kulturcampus Domäne Marienburg** 2  
Domänenstraße 1

**Samelson-Campus** 3  
Samelson Platz 1

**Bühler-Campus** 4  
Lübecker Straße 3

**Institutsgesäude Kessler Straße** 5  
Kessler Straße 57

**Institutsgesäude Moltkestraße** 6  
Moltkestraße 86

**Center for World Music** 7  
Timotheusplatz



## 4 Faculties

1. Educational and Social Sciences
2. Culture Studies and Aesthetic Communication
3. Linguistics and Information Sciences
4. Mathematics, Natural Sciences, Economics and Computer Science



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2. Culture Studies and Aesthetic Communication
3. Linguistics and Information Sciences
  - ▶ Institute for Information Sciences and Linguistic Technologies
  - ▶ ...
4. Mathematics, Natural Sciences, Economics and Computer Science
  - ▶ Institute for Computer Science
  - ▶ Institute for Economics and Information Systems
  - ▶ Institute for Mathematics and Applied Computer Science
  - ▶ ...

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4. Mathematics, Natural Sciences, Economics and Computer Science
  - ▶ Institute for Computer Science
    - ▶ Machine Learning (ISMLL) — Prof. Schmidt-Thieme
    - ▶ Data Science — Prof. Landwehr
    - ▶ Software Engineering — Prof. Schmid
    - ▶ Intelligent Information Systems — Prof. Althoff
  - ▶ Institute for Economics and Information Systems
  - ▶ Institute for Mathematics and Applied Computer Science
  - ▶ ...

# ISMILL

- ▶ Information Systems and Machine Learning Lab
- ▶ research group focused on
  - ▶ **supervised machine learning**
  - ▶ for complex data and
  - ▶ complex decisions
- ▶ professor, postdoc & 15–20 PhDs
- ▶ over 200 papers,  
many at the best Machine Learning conferences and journals
- ▶ several best paper awards
- ▶ won ECML challenge 2009 and 2016
- ▶ 4 multi million Euro European research projects with industry partners
- ▶ many focused research projects
- ▶ 7 professors emerged from the group within the last 10 years



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# Goals of the Program

- ▶ a deep and thorough introduction to cutting edge research in
  - ▶ Machine learning,
  - ▶ Big Data and
  - ▶ analytical technology
  
- ▶ complementary training in selected application domains
  - ▶ marketing, logistics, computer science, environmental science
  
- ▶ brings together students from all over the world and different background disciplines
  - ▶ completely taught in English
  
- ▶ Data Analytics is a **research Master program**.

# Program Requirements

- ▶ DA targets students with an analytical Bachelor's Degree
  - ▶ Computer Science, Information Technology
  - ▶ Mathematics, Statistics
  - ▶ Business Administration, Economics
  - ▶ and related fields
  
- ▶ Required proficiencies:
  - ▶ math
  - ▶ programming
  - ▶ English

# Data Analytics Students

| Intake        | Applied      | Enrolled   | Countries |
|---------------|--------------|------------|-----------|
| WiSe 2021/22  | 2116         | 26         | 15        |
| SoSe 2021     | 1301         | 35         | 20        |
| WiSe 2020/21  | 1798         | 26         | 12        |
| SoSe 2020     | 1488         | 19         | 10        |
| WiSe 2019/20  | 2122         | 31         | 15        |
| SoSe 2019     | 1407         | 47         | 20        |
| WiSe 2018/19  | 1896         | 26         | 14        |
| SoSe 2018     | 1116         | 25         | 15        |
| WiSe 2017/18  | 1012         | 39         | 18        |
| SoSe 2017     | 470          | 27         | 13        |
| WiSe 2016/17  | 170          | 31         | 13        |
| <b>Total</b>  | <b>14896</b> | <b>332</b> |           |
| <b>Alumni</b> |              | <b>84</b>  |           |

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# Program Structure

- ▶ 4 semesters spanning over two years
- ▶ total 120 CPs (credit points) which are divided into
  - ▶ A methodological core (65%)
  - ▶ An application area (10%)
  - ▶ A master's thesis (25%)

# Courses First Year

|          | Nr  | Module                         | Type    | CPs |
|----------|-----|--------------------------------|---------|-----|
| 1st Term | M1  | Machine Learning (*)           | Lecture | 6   |
|          | M2  | Modern Optimization Techniques | Lecture | 6   |
|          | M3  | Programming Machine Learning   | Lab     | 6   |
|          | M10 | Project (part I)               | Project | 3   |
|          | AM1 | <i>Application Module I</i>    | -       | 6   |

|          | Nr  | Module                      | Type    | CPs |
|----------|-----|-----------------------------|---------|-----|
| 2nd Term | M5  | Big Data Analytics          | Lecture | 6   |
|          | M6  | Advanced Machine Learning   | Lecture | 6   |
|          | M7  | Data and Privacy Protection | Lecture | 3   |
|          | M8  | Distributed Data Analytics  | Lab     | 6   |
|          | M4  | Seminar Data Analytics I    | Seminar | 4   |
|          | M10 | Project (part II)           | Project | 6   |

(\*) students who had Machine Learning already in their Bachelor, please replace this course by an additional choice from the methodological specialization.

# Courses Second Year

|          | Nr  | Module                               | Type    | CPs |
|----------|-----|--------------------------------------|---------|-----|
| 3rd Term | M11 | Planning and Optimal Control         | Lecture | 6   |
|          | MS1 | <i>Methodological Specialization</i> | Lecture | 6   |
|          | M9  | Seminar Data Analytics II            | Seminar | 4   |
|          | M12 | Project (part III)                   | Project | 6   |
|          | AM2 | <i>Application Module II</i>         | -       | 6   |
|          | Nr  | Module                               | Type    | CPs |
| 4th Term | M13 | Seminar Data Analytics III           | Seminar | 4   |
|          | M14 | Master Thesis                        | Thesis  | 30  |

# Elective Courses 1: Methodological Specialization

- ▶ to deepen your methodological understand and widen the models and methods you command.
- ▶ currently 5+3 courses:
  - ▶ Machine Learning for IT Security (Landwehr) – Summer
  - ▶ Advanced Computer Vision (Landwehr) – Summer
  - ▶ Advanced Case Based Reasoning (Althoff) – Summer
  - ▶ Time Series Analysis (Mentemeyer) — Summer
  - ▶ Deep Learning (Schmidt-Thieme) — Summer

Courses paused in Winter 2020/21 and Summer 2021:

- ▶ Bayesian Networks — every odd Summer: 2022
  - ▶ Computer Vision — every even Summer: 2023
  - ▶ Business Analytics — Winter
- ▶ you have to choose at least one course (6 CP)
    - ▶ marks of just one course count to your final degree

## Elective Courses 2: Application

- ▶ to provide a testbed for applying data analytics methods.
- ▶ currently from 6 areas:
  - ▶ Computer Science / Software Engineering
  - ▶ Computer Science / Media Systems
  - ▶ Business Administration
  - ▶ Information Retrieval and Information Sciences
  - ▶ Natural Language Processing
  - ▶ Environmental Sciences
- ▶ you have to choose courses worth at least 12 CP from one area
  - ▶ e.g., two lectures with tutorials
  - ▶ marks of courses worth 12 CP count to your degree

# Back on Campus This Winter 2021/22

- ▶ due to the Corona Covid19 virus outbreak, the three terms Summer 2020, Winter 2020/21 and Summer 2021 had to be taught online.
  - ▶ challenging setting, esp. for you students.
  - ▶ esp. in the last term, motivation dropped notably.
- ▶ since this Winter term 2021/22, all **seminars**, **tutorials** and **lab courses** will be taught on campus again.
  - ▶ also all lectures from ISMLL and some others will be taught on campus,
  - ▶ but **lectures** of most other groups will be delivered online once more.
  - ▶ for students suffering from travel restrictions, we will work out restricted possibilities to participate online.
- ▶ to enter campus, you need to proof your 3G status (vaccinated, recovered or negatively tested).
  - ▶ for tests, only certified tests count (e.g., done in a drug store).
  - ▶ my strong recommendation: get vaccinated as soon as possible and get an electronic vaccination certificate on your mobile phone!

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# Take Your Studies Seriously

1. Attend the lectures!
2. Take notes in the lectures!
3. Solve the tutorial and lab problems on your own!
4. Read the books!

Example efforts: 2h lecture plus 2h tutorial

- ▶ 6 CP = 180h student effort
- ▶ 4h/week face-to-face
- ▶ 6h/week solving tutorials
- ▶ 2h/week post-preparation and reading
- ▶ 12h exam preparation
- ▶  $(4 + 6 + 2)h/w \cdot 14w + 12h = 180h$



# Exam Regulations (1/2)

## ▶ **examination periods:**

- ▶ exams in the first 4 weeks after the lecture period ends
- ▶ Winter 21/22: 14.2.2022 – 11.3.2022

## ▶ **trials:**

- ▶ you have 3 trials for each written exam
  - ▶ one at the end of term
  - ▶ one at the beginning of the next term
  - ▶ one at the end of term next year
    - this usually will prolong your studies
- ▶ we may switch later trials to oral exams

## ▶ **exam conditions:**

- ▶ may vary from course to course as documented in the course catalogue
- ▶ for your courses at ISMLL:
  - ▶ open book

# Exam Regulations (2/2)

## ▶ duration of studies:

- ▶ default duration are 4 terms
- ▶ you are welcome to extend by a term or two if you need it
- ▶ after 10 terms you will have to pay long-term study fees (or after 16 terms minus the terms needed for your bachelor at a German university)

## ▶ formal regulations:

- ▶ Masterprüfungsordnung Informationsmanagement und Informationstechnologie (currently in German only) and
- ▶ Course Catalogue International Master in Data Analytics

# What to get Done Before Your Studies Start (1/2)

- ▶ an account at our computing center
  - ▶ will allow you to register for courses
  - ▶ account information has been sent by electronic mail
  
- ▶ register for all your courses at the teaching information system LSF
  - ▶ LSF: Lehre–Studium–Forschung: Teaching–Studies–Research
  - ▶ Machine Learning, Programming Machine Learning Lab, Modern Optimization Techniques
  - ▶ a specialization and an application course
  
- ▶ get a computer/laptop you can work on whenever you have to
  - ▶ programming editor/IDE
  - ▶ compiler/interpreter (esp. Python)
  - ▶ programming language documentation
  - ▶ LaTeX (or OpenOffice)

# What to get Done Before Your Studies Start (2/2)

- ▶ get your first books
  - ▶ at least Murphy and Boyd
  
- ▶ refresh your Math
  - ▶ at least Murphy, ch. 2
  - ▶ Murphy, ch. 1–6
  
- ▶ refresh your programming skills
  - ▶ esp. Python
  
- ▶ find a quiet place to work

# Whom to ask

| Questions or issues regarding | ask                            |
|-------------------------------|--------------------------------|
| exercises                     | course tutor                   |
| lecture                       | course lecturer                |
| program                       | program director               |
| program director              | study dean                     |
| computers                     | computing center,<br>room E114 |

Welcome to University of Hildesheim!

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I wish you successful studies!