International Master in Data Analytics

Welcome to Winter Term 2025/26

Dr. Tom Hanika & Prof. Dr. Niels Landwehr

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

15.Oktober.2025

Outline

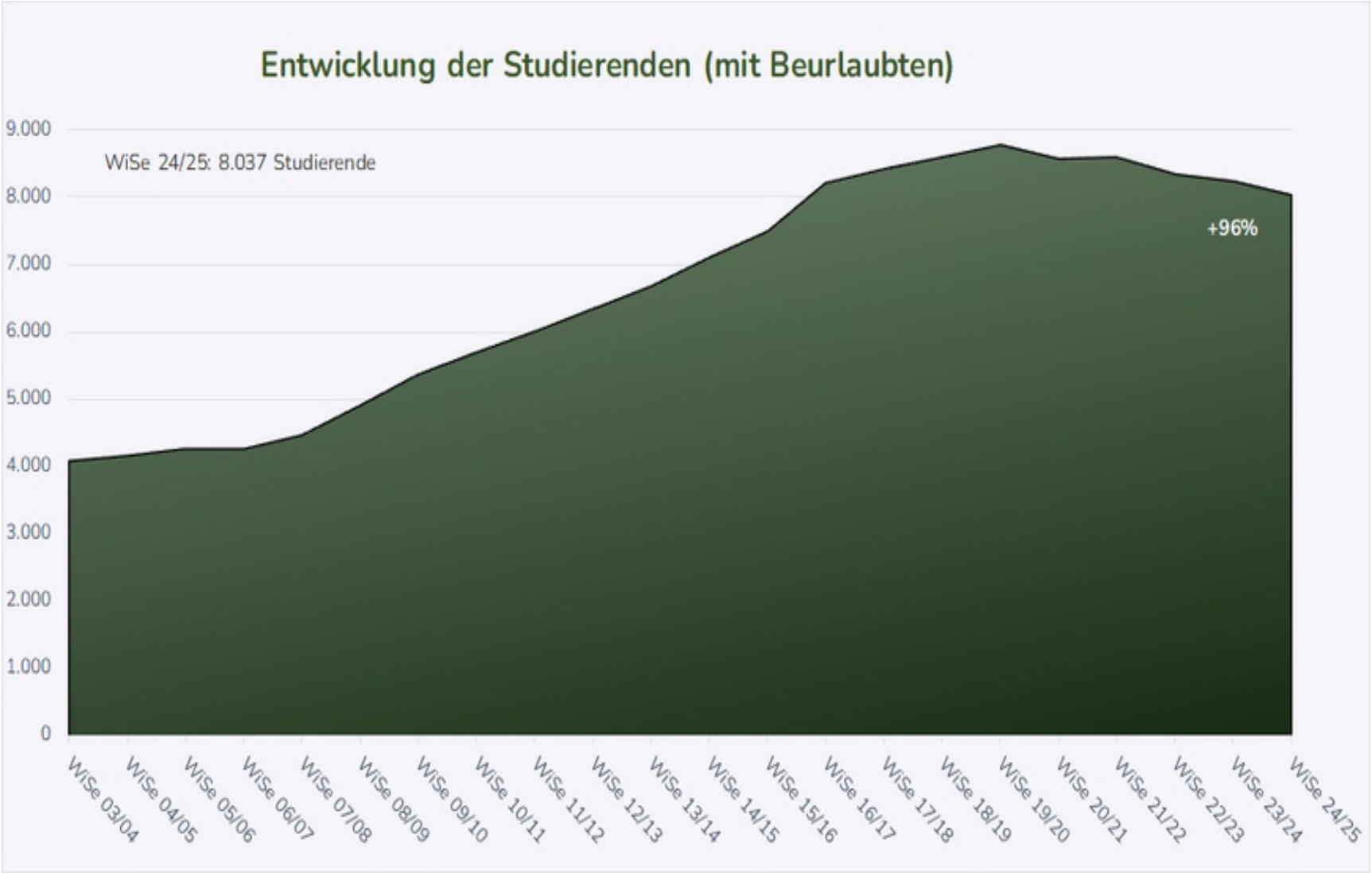
1. About us
2. The Goals of the Data Analytics Program
3. The Structure of the Data Analytics Program
4. Exams and Preparation

Outline

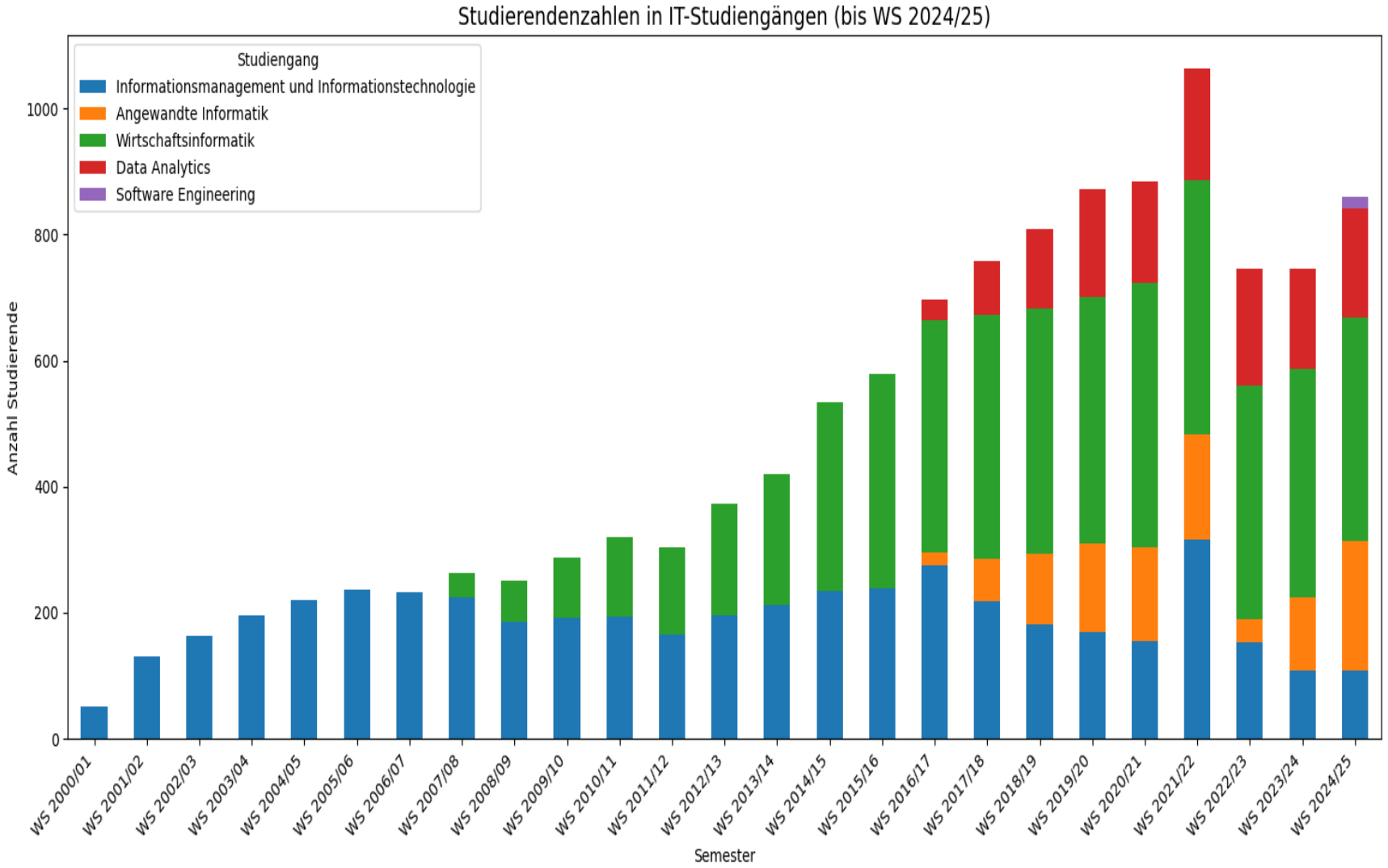
University of Hildesheim

- small German research university
  - about 8000 students
  - 100 professors, 900 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)
WiSe 24/25: 8.037 Studierende
+96%
9.000
8.000
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0
WiSe 03/04
WiSe 04/05
WiSe 05/06
WiSe 06/07
WiSe 07/08
WiSe 08/09
WiSe 09/10
WiSe 10/11
WiSe 11/12
WiSe 12/13
WiSe 13/14
WiSe 14/15
WiSe 15/16
WiSe 16/17
WiSe 17/18
WiSe 18/19
WiSe 19/20
WiSe 20/21
WiSe 21/22
WiSe 22/23
WiSe 23/24
WiSe 24/25

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

Institutsgebäude Kessler Straße 5
Kessler Straße 57

Institutsgebäude Moltkestraße 6
Moltkestraße 86

Center for World Music 7
Timotheusplatz

4 Faculties

FB1 Educational and Social Sciences

FB2 Culture Studies and Aesthetic Communication

FB3 Linguistics and Information Sciences

FB4 Mathematics, Natural Sciences, Economics and Computer Science

4 Faculties

FB1 Educational and Social Sciences

FB2 Culture Studies and Aesthetic Communication

FB3 Linguistics and Information Sciences

- Institute for Information Sciences and Linguistic Technologies
- ...

FB4 Mathematics, Natural Sciences, Economics and Computer Science

- Institute for Computer Science
- Institute for Economics and Information Systems
- Institute for Mathematics, Mathematics Education, and Computer Science Education
- ...

4 Faculties

FB1 Educational and Social Sciences

FB2 Culture Studies and Aesthetic Communication

FB3 Linguistics and Information Sciences

- Institute for Information Sciences and Linguistic Technologies
- ...

FB4 Mathematics, Natural Sciences, Economics and Computer Science

- Institute for Computer Science
  - Machine Learning (ISMLL) — Prof. Schmidt-Thieme
  - Data Science — Prof. Landwehr
  - Intelligent Assistive Systems — Prof. Roitberg
  - Software Engineering — Prof. Schmid
  - Engineering Interactive Applications — Prof. Hesenius
- Institute for Economics and Information Systems
- Institute for Mathematics, Mathematics Education, and Computer Science Education
- ...

ISML LAB (ISMLL)

- Information Systems and Machine Learning Lab
- research group focused on
  - **supervised machine learning**
  - for complex data and
  - complex decisions
- two professors, 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
- 8 professors emerged from the group within the last 15 years

Data Science LAB

- Data Science Group
- Located at the main campus
- research group focused on
  - machine Learning, in particular deep learning
  - computer Vision
  - interdisciplinary applications (e.g. agriculture/sustainability, psychology)
- professor, & 3 PhDs

- publishing at top venues like ICLR, Neurips (and smaller venues a.w.)
- part of interdisciplinary research consortia, e.g. EU-funded

VWFS DARC

- **V**olkswagen **F**inancial **S**ervices **D**ata **A**nalytics **R**esearch **C**enter
- Recent establishment of a research center, focused on
  - Advanced Machine Learning Concepts
    - Deep time series forecasting
    - Computer vision
    - Recommender systems
    - Reinforcement learning
  - Trustworthy AI
    - Uncertainty quantification
    - Explainable AI
    - Transfer and Multi-task learning
    - Data & ML model monitoring
- two professor, one postdocs & 8-10 PhDs
- collaboration in its 6th year
- over 10 papers, many at the best Machine Learning conferences
- biggest industry partner, working on interesting ML problems
- many focused research projects

Outline

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 2025/26	4526	20	7
SoSe 2025	3637	53	16
WiSe 2024/25	4325	24	14
SoSe 2024	2852	23	11
WiSe 2023/24	2647	34	18
SoSe 2023	1909	21	16
WiSe 2022/23	2343	40	18
SoSe 2022	1348	26	16
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
Total	36474	536	

Outline

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

1st Term

Nr	Module	Type	CPs
M1	Machine Learning (*)	Lecture	6
M2	Modern Optimization Techniques	Lecture	6
M3	Programming Machine Learning	Lab	6
M10	Project (part I)	Project	3
AM1	*Application Module I*	-	6

2nd Term

Nr	Module	Type	CPs
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

3rd Term

Nr	Module	Type	CPs
M11	Planning and Optimal Control	Lecture	6
MS1	*Methodological Specialization*	Lecture	6
M9	Seminar Data Analytics II	Seminar	4
M12	Project (part III)	Project	6
AM2	*Application Module II*	-	6

4th Term

Nr	Module	Type	CPs
M13	Seminar Data Analytics III	Seminar	4
M14	Master Thesis	Thesis	30

Elective Courses 1: Methodological Specialization

- to deepen your methodological understanding and widen the models and methods you command.

- currently courses:
  - Machine Learning for IT Security (Landwehr)
  - Topics in Statistical Inference (Landwehr)
  - Advanced Computer Vision (Landwehr)
  - Self-driving cars (Roitberg)
  - Multimodal Foundation Models (Roitberg)
  - Time Series Analysis (Mentemeyer)
  - Deep Learning (Schmidt-Thieme)
  - Large Language Models (Schmidt-Thieme)
  - Conceptual Data Analysis (Hanika)
  - **NOT all courses open every semester**
  - **there may be more courses time to time (Please check LSF)**
- 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
  - You can earn up to 6 credits from Soft Skills (Deutschkurs).

Student Research Projects

- to provide a testbed for applying data analytics methods.

- currently structured with 15 CPs over 2 terms:
  - Work closely under supervision in teams
  - Students present final outcomes in SRP Conference

- several state-of-the-art papers published
  - German AI Conference (2021, 2022)
  - DASC (2023)
  - ECDA (2019, 2020)
  - ECML-Workshops (2018, 2020)
  - DEXA (2019, 2020)

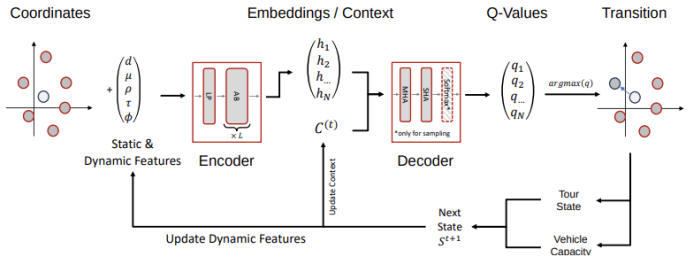


Fig. 1. Architecture overview

Advanced Track and Honours Option

- The standard program is called Fundamental Track.
- For students with a Data Science / AI / ML Bachelor, we also offer the Advanced Track.
  - requirement: 30 ECTS Data Analytics already in the Bachelor, e.g., ML, MOT, ML2/DL, BD, PML.
- also available for all students as a Honours option.
  - you complete $120 + 30 = 150$ ECTS in this case
  - study duration 4 terms + 1 honours term = 5 terms
  - several of the methodological specializations

Outline

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 2025/26: From 6.March.2026
- **trials:**
  - Students can now take exams **limitlessly**, with no restriction on the number of attempts.
  - **All attempts** will be recorded on the **transcripts of records**.
- **exam conditions:**
  - may vary from course to course as documented in the course catalogue

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)
  - learn LaTeX

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

- get your first books
  - at least Murphy (available as PDF for free)
- refresh your Math
  - at least Murphy, ch. 2
  - Murphy, ch. 1–6
- refresh or acquire 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
IT service center	computing center, room E114 (main campus)

Welcome to University of Hildesheim!

Welcome to the
International Master in Data Analytics!

We wish you successful studies!