The data science Master degree

Data & Knowledge Engineering (MDKE)

OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

INF FACULTY OF COMPUTER SCIENCE

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Knowledge Management & Discovery Lab

The Knowledge Management & Discovery Lab @ U Magdeburg

Research focus:

- Learning methods for streams and for time series with gaps
- Cost-aware information acquisition

Application areas:

- Treatment outcome prediction
- Monitoring the health of humans and machines
- Inferring strategies in experiments

Teaching: courses and projects on

- Data mining
- Recommenders
- Business informatics

1. MDKE for data science

2. Planing your MDKE studies

3. How to choose modules

4. Getting Advice

1. MDKE for data science

What to associate with data science?

1

[1] From duckduckgo for 'data science word cloud', screenshot taken Oct 08, 2024

Data science and MDKE

What do you need to do Data Science?

1. Data
2. Methods
    - to process data – efficiently
    - to learn from data
    - to describe complex objects
    - to present complex objects and what we know on them
3. Business understanding
4. Understand how to match Data with Methods

Data science and MDKE

What do you need to do Data Science?

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- a medical record
- a patient
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Structure of the MDKE

Thematic areas:

Starting:	Fundamentals of Data Science	[12-18 ECTS]
1.	Learning Methods and Models of Data Science	[18-36 ECTS]
2.	Data Processing for Data Science	[18-30 ECTS]
3.	Applied Data Science	[18-24 ECTS]
and finally:	the Master thesis	[30 ECTS]

Where to find more information?

We proudly present:

`https://bookstack.cs.ovgu.de/shelves/master-data-and-knowledge-engineering`

This is part of our `bookstack` that contains an overview for each degree

For the MDKE (winter, resp. summer), the `bookstack` contains:

- an overview of the plan of studies, with colours per thematic area
- one section per area, with all modules that fit to it [a] *and are **active** now* [b]
- the description of each module, including goals, content, examination form
- information about modules that are inactive but open for exams
- links to other important documents, e.g. the statutes of the degree

[a] You may find a module more than once; some modules fit in more than one area.

[b] A module can be 'inactive', e.g. if the teacher is on sabbatical leave.

The LSF and the MHB 

Where to find more information?

The LSF and the MHB

- Under `lsf.ovgu.de` you find information on how you register to a module, and links to `elearning.ovgu.de`
- the module catalogue of the degree, also known as “Module Hand Book” (MHB) is in the `bookstack`, you find:
  - the most recent version – winter and summer *together*
  - `archive` of the older versions [2]

  The MHB is updated each semester.

[2] You may need to check it for modules that are inactive in this semester or were inactive earlier.

2. Planing your MDKE studies

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- The data science Master DKE has no compulsory modules.
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1. Make yourself familiar with the types of modules we offer
   - 1.1 Lecture (called “Vorlesung”) with Exercises (called “Übung”)
   - 1.2 Seminar
   - 1.3 Scientific Teamproject or Teamproject for short, intended for teams; is mapped exclusively to the area ’Applied Data Science’
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4. Consult your mind and your heart: write down what you are interested in, listen to your curiosity, go with your strengths
5. Plan for three semesters, but be ready to re-plan later!

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HELP us eliminate discrepancies and errors:

If you find a disagreement among MHB, LSF and statutes [a]

If you hear that a teacher shifted their module to another area mid-semester.

THEN DO NOT try to take advantage!

RATHER: **INFORM** the mentors & studies coordinator immediately!

[a] e.g. a teamproject assigned outside the ADS – the top-1 error.

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- There is an area called 'Additional modules' / 'Zusätzliche Module'.
- If a module is assigned to this area, you do not get ECTS for it.
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- and you discover it only when you find that you did not get the ECTS.
- and then you cannot change it. . .

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Where to find more information?

Landing page: `https://www.inf.ovgu.de/inf/en/Study/Being+a+student/Incoming.html`

and from there you follow the links to:

- Entry point for new students
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Interviews with teachers on their courses under

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From that page you reach interview videos, in which teachers elaborate on their courses: what the course is about, what expectations they have from the students, what can the students do after completing the course successfully

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Mentors!

There is an international team of mentors to help you in the start of your studies. Infos on how to reach them from the URLs above.

3. How to choose modules

When to choose which modules?

EXAMPLES hereafter

Area	1st & 2nd semester	2nd & 3rd semester
Fundamentals of Data Science	PPSW [A] Data Mining I & Machine Learning [L] Introduction to Simulation [S]	
Learning Methods & Models for Data Science	(S) Applied Discrete Modelling, (L) Recommenders, (L) Introduction to Deep Learning [DL]	(L) Data Mining II, (A, L) Seminars: Advanced topics in ML, Predictive Maintenance, . . . Evolutionary Multiobjective Optimization [CI], [DL] Learning Generative Models . . .
Data Processing for Data Science	Advanced Database Models [D], Transaction Processing 2, Information Retrieval, (D) Data Warehouse Technologies, Advanced Topics in Databases, Introduction to Distributed Sensor Data Fusion, Parallel Storage Systems, VLBA – Cloud DevOps Technologies, . . .	
Applied Data Science	XXXXXXXXXXXXX	
Teamproject	XXXXXXXXXXXXX	

What do these symbols mean? in the Examples

Mark after the title	Mark before the title	How to read it
Introduction to Deep Learning [DL]	[DL] Learning Generative Models	'DL' is a competency. The module with the mark '[...]' after the title delivers this competency; the module with the mark at the right demands this competency. Hence: pass the module that gives the competency before you attempt the module that demands this competency.
Advanced Database Models [D]	(D) Data Warehouse Technologies	The mark '(...)' denotes a 'better-have' competency. Hence: better attend the module at the left before you attempt the module at the right.

On the naming of the modules

Machine Learning	Advanced Topics of Machine Learning	The module at the right expects skills that you learn in the module at the left.
Data Mining I	Data Mining II	The module at the right expects some skills. Best choice is the module at the left.

Special cases

PPSW [A]	(A, _) Seminar on '...'	Next to competencies on methods (e.g. L or DL), these modules demand personal and social skills. PPSW delivers such skills. If you never attended a seminar, you need PPSW.

So, how to choose modules in the 1st semester?

One possible way:

1. Plan the ’Fundamentals of Data Science’ over the first two semesters.
2. Select from ’Learning . . . ’: There are entry-barriers, so plan over all three semesters.
3. Select from ’Data Engineering . . . ’: The modules of this area are heavily visited but have less entry-barriers, so plan for semesters 1 and 2 first.

Another possible way:

1. Plan the ’Fundamentals of Data Science’ over the first two semesters.
2. Go to ’Applied Data Science’ and check what topics you want to attend in semesters 2 and 3. Check the titles and descriptions of the modules.
3. Go to ’Learning . . . ’ and pick the modules that deliver the skills you need for your Applied Data science choice.
3. Go to ’Data Engineering . . . ’ and do alike.

. . . and how to make a full plan?

Option 1: Go wide to learn as many topics as possible.

1. Identify some business areas that you consider promising / attractive, e.g. Cloud computing, Robotics, Business Informatics, Security, Health . . .
2. Find the professor(s) who teach in these areas
3. Find the courses they offer in the data science MDKE, and schedule them
4. Make sure that you choose *no less than three areas* in that way

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Option 2 which demands a fallback: Go deep because DL is used everywhere.

1. Schedule all courses offered by Prof. Sebastian Stober
2. Schedule all courses that he demands as prerequisites
3. If you need and want to wait: choose courses like 'Logic for Knowledge Representation' to make yourself fit on important concepts like KR

WARNING: If you fail one course, then you can give it up. If you fail more, you are tied.

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Option 3: Train yourself *cautiously* on learning methods

1. Find courses with titles associated to mining, learning and intelligence
2. Schedule these courses, concentrate on doing all assignments associated to them
3. If you find them difficult, ask for help/advice!
4. Once you have passed some of them, go for Option 1 and/or Option 2

When making a full plan . . .

Things to keep in mind:

1. The data science MDKE has many courses.
   No course agrees with all students. For each course it holds that some find it fine and others find it boring; some find it easy and others find it difficult.

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2. The option you choose determines who is willing to give you a teamproject and supervise your master thesis.
   Each teacher has limited number of projects and theses, and a limited amount of time. The more a teacher can rely on your background and competencies, the better are your chances to get a project/thesis from him/her.

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3. There is a difference between (a) knowing how to induce models and assess their quality and (b) applying algorithms from a library with help of a co-pilot.
   In the data science Master DKE, we want you to learn the former.

4. Getting Advice

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- Exam issues: Examinations Office
- Complex plans of studies, general troubleshooting: Studies coordinator (me)
  `myra@iti.cs.uni-magdeburg.de`
- General issues on international studies: Coordinator of International Studies

Thank you for your attention!

Much success with your studies with us!