The data science Master degree

Data & Knowledge Engineering (MDKE)

Myra Spiliopoulou (Studies Coordinator)
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. More on how to choose modules?

4. Getting Advice
1. MDKE for data science
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
What do you need to do Data Science?

1. Data

- a social network
- a medical record
- a patient
- a disease
- a bicycle
- a pizza
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2. **Methods**
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   - 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**
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]
Module catalogue of the degree, also known as “Module Hand Book” (MHB)

➤ This is a large PDF document:
  ★ It contains the description of each module we offer in the FIN.
  ★ It contains one section per thematic area of the degree, with all the modules that fit to this area.
  ★ In it, you may find a module more than once! Some modules fit to more than one thematic area.

➤ You find it under
  https://www.inf.ovgu.de/en/Study/Being+a+student/Examination+Office/Study+Regulations.html
  Entry ‘Data & Knowledge Engineering’ (in the middle of the page, left side)

➤ It is updated once per semester ⇒ Choose the most recent one.

and in the LSF
2. Planing your MDKE studies
Planing your MDKE studies

IMPORTANT:

▶ The data science Master DKE has no compulsory modules.
▶ It is up to you to choose the modules in each thematic area.
▶ Obligatory: one Scientific Teamproject and the Master thesis

HOW TO CHOOSE MODULES:

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'
   1.4 Individual project, intended for one student only

2. Consult the Module catalogue to find what we offer in winter & summer
3. THEREAFTER consult the LSF to find what we offer in this term
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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www.kmd.ovgu.de
DOs and DONT’s

When you choose modules

▶ DO NOT choose seminars before attending PPSW, unless you have had a scientific seminar in your previous studies

▶ DO NOT choose courses that expect background you do not have

▶ DO NOT assume that you can acquire background knowledge you do not have in parallel to a course that requires this background knowledge

▶ DO consult the interview video with the teacher, before enrolling to the course

When you assign modules to the thematic areas

▶ DO NOT use LSF to map courses to areas; use only the Module Hand Book

▶ DO map team projects exclusively to the area ‘Applied Data Science’ – even if the Module Hand Book seems to permit something different !

▶ DO NOT ask the teacher to shift your assignment of his/her module to a thematic area that suits you better !
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the course is also assigned to a thematic area.
If you do not assign the course to a thematic area per hand,
it is assigned automatically to a default area!

CAUTION
▶ There is an area called ‘Additional modules’ / ‘Zusätzliche Module’.
▶ If a module is assigned to this area, you do not get ECTS for it.
▶ Under some circumstances, the examination registration system assigns a module for you to this area by default and you discover it only when you find that you did not get the ECTS.
▶ and then you cannot change it.

THEREFORE:
ALWAYS choose MANUALLY the thematic area of the module.
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? Did I give my exam paper?
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If NO:
- Tell the teacher IMMEDIATELY.
- Apply for a change to the Examination Office.
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No guarantees...
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No guarantees . . .
BEFORE entering EACH oral exam, including seminar, team project presentation etc:

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Where to find more information?


and from there you follow the links to:

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

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. More on how to choose modules
<table>
<thead>
<tr>
<th>Area</th>
<th>1st &amp; 2nd semester</th>
<th>2nd &amp; 3rd semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fundamentals of Data Science</strong></td>
<td>PPSW [A]</td>
<td>Topics in Algorithmics, Introduction to Numerical Ordinary and Partial Differential Equations and their Applications</td>
</tr>
<tr>
<td></td>
<td>Data Mining I, Machine Learning [L]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction to Simulation [S]</td>
<td></td>
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<tr>
<td><strong>Applied Data Science</strong></td>
<td>XXXXXXXXXXXXXXXXXXXXX</td>
<td></td>
</tr>
<tr>
<td><strong>Teamproject</strong></td>
<td>XXXXXXXXXXXXXXXXXXXXX</td>
<td></td>
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<tr>
<td>Mark after the title</td>
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<td>How to read it</td>
</tr>
<tr>
<td>----------------------</td>
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<tr>
<td>Introduction to Deep Learning [DL]</td>
<td>[DL] Learning Generative Models</td>
<td>'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.</td>
</tr>
<tr>
<td>Advanced Database Models [D]</td>
<td>(D) Data Warehouse Technologies</td>
<td>The mark ‘(…)’ denotes a 'better-have' competency. Hence: better attend the module at the left before you attempt the module at the right.</td>
</tr>
</tbody>
</table>

**Special cases**

| PPSW [A] | (A) Advanced topics \{of KMD, of ML, \ldots\}, Seminar 'Predictive Maintenance', Seminar ‘…’ | The modules in the middle column are on advanced topics; most of them are seminars. PPSW delivers skills that you need to pass a seminar. If you never attended a seminar, you need PPSW. |
| Scientific computing [L+] | | Delivers mathematical underpinnings that are valuable for many other courses. |

**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. |
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

**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.

**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!
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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.

   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.

2. 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.
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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!