The Data Science Master degree

Data & Knowledge Engineering

Studies Coordinator Prof. Myra Spiliopoulou
Institute for Technical and Business Information Systems
http://www.kmd.ovgu.de/
DKE in the times of Data Science

What do you need to do Data Science?

1. Data
2. Methods
   - Methods for processing data – efficiently
   - Methods for learning from data
   - Methods for describing complex objects
   - Methods for visualizing complex objects and what we know on them
3. Business understanding
4. Understanding on how to match Data with Methods
DKE in the times of Data Science

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DKE in the times of Data Science

What Expertise do you need to become a Data Scientist?

2. Methods
   - Methods for processing data – efficiently
   - Methods for learning from data
   - Methods for describing complex objects
   - Methods for visualizing complex objects and what we know on them

[Visual representation of Data Engineering, Data Mining / Machine Learning, Knowledge Engineering, and Visualization]
DKE in the times of Data Science

What Expertise do you need to become a Data Scientist?

2. Methods
   - Methods for processing data – efficiently
   - Methods for learning from data
   - Methods for describing complex objects
   - Methods for visualizing complex objects and what we know on them

3. Business understanding

Data Engineering
Data Mining / Machine Learning
Knowledge Engineering
Visualization
Hands-on using DKE in business applications
DKE in the times of Data Science

What Expertise do you need to become a Data Scientist?

2. Methods
   - Methods for processing data – efficiently
   - Methods for learning from data
   - Methods for describing complex objects
   - Methods for visualizing complex objects and what we know on them

3. Business understanding

Master DKE

- Data Engineering
- Data Mining / Machine Learning
- Knowledge Engineering
- Visualization

Hands-on using DKE in business applications
Data Science Master DKE in the Faculty of Computer Science

- Bachelor degree (at least 10 CS courses)

Data Science Master DKE

- 4 semesters / 120 ECTS
  - 3 semesters = 90 ECTS for courses
  - 1 semester = 30 ECTS for the Master thesis
Structure of the Master DKE

FIVE thematic areas:

1. Fundamentals
2. Models
3. Methods I
4. Methods II
5. Applications
Structure of the Master DKE

FIVE thematic areas:

1. **Fundamentals**: Basics of data mining, database processing, data/image/multimedia engineering

2. **Models**: Knowledge representation, knowledge modeling, knowledge processing

3. **Methods I**: Knowledge discovery, artificial intelligence, machine learning

4. **Methods II**: Information processing and retrieval

5. **Applications**: Application of DKE, including business applications, medical applications, engineering applications, core CS applications (e.g. security, image understanding)
Structure of the Master DKE

Choose modules in the thematic areas:

1. Fundamentals: 30 ECTS (0 if you are in the 3–Semester MDKE)
2. Models: 12–24 ECTS
3. Methods I: 12–24 ECTS
4. Methods II: 12–24 ECTS
5. Applications: 12–24 ECTS

Master thesis: 30 ECTS

6 ECTS reserved for a TeamProject in one of the thematic areas
Where to choose modules from?

Fundamentals:

- Late semesters of the FIN programme for Bachelor degrees
- Modules from the FIN programme for Master degrees

Models, Methods I & II, Applications:

- Modules from the FIN programme for Master degrees

5 ECTS
Information on all modules

Module catalogues, with the assignment of courses to each thematic area are under

http://www.inf.ovgu.de/ordnungenma.html

➢ Move down the page to Data & Knowledge Engineering
➢ Under the entry Modulhandbuch you find all offered modules under

→ Modulkatalog (Übersicht über alle Module): Sommer 2016

The modules offered in the current term are in the LSF.

DO NOT use LSF to map modules to thematic areas.
Information on all modules

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→ Modulkatalog (Übersicht über alle Module): Sommer 2016

This catalogue is updated once per semester, so make sure you choose the most recent one.

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The index provides a fast overview on which modules fit to which area.

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**DO NOT** use LSF to map modules to thematic areas.
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- Move down the page to **Data & Knowledge Engineering**
- Under the entry **Modulhandbuch** you find all offered modules under

  ➔ **Modulkatalog** (Übersicht über alle Module): **Sommer 2016**

The index provides a fast overview on which modules fit to which area.
We expect changes in this overview only in exceptional cases (e.g. for fully redesigned modules).

**DO NOT use LSF to map modules to thematic areas.**
Choosing modules to

PLAN YOUR STUDIES
How to choose modules?

YOU
choose the courses you want to attend
Example Plan – with focus on "Mining"

Fundamentals + Methods I
30+24 ECTS

- Data Mining
- Machine Learning
- Intelligent Data Analysis
- Swarm Intelligence
- Organic Computing
- Neural Networks
- Adv. Topics in KMD
- Adv. Topics in Machine Learning
- Seminars & Teamprojects in DKE, KMD, SwarmIntelligence, FuzzySys

Models: 12 ECTS

- Applied Discrete Modelling
- Bayesian Networks
- Fuzzy Systems
- Neural Networks

Methods II: 12 ECTS

- Data Warehousing
- Advanced Topics in Databases
- In-Memory Technologies

Applications: 12 ECTS

- Biometrics
- CRM, Recommenders
- Multimedia, Security

and many more

and more

and more
Example Plan – with focus on "Big Data"

Fundamentals + Methods I: 18+ ECTS
- Data Mining
- Machine Learning
- Intelligent Data Analysis
- Adv. Topics in KMD
- Adv. Topics in Machine Learning
- Seminars DKE, KMD, FuzzySys
- Teamprojects KMD, DKE, FuzzySys

Models: 12 ECTS
- Ontologies
- Applied Discrete Modelling
- Bayesian Networks
- Neural Networks

Fundamentals + Methods II: 36+ ECTS
- Distributed Data Management
- Advanced Topics in DB
- In-Memory Technologies I & II
- Seminar & Teamproject DBSE
- Data Warehousing
- Information Retrieval
- Multimedia Retrieval

Applications: 12 ECTS
- Very Large Business Applications
- Multimedia and Security
- CRM, Recommenders
- Image Analysis
Example Plan – with focus on "Business"

Fundamentals +Methods I: 18 ECTS
- Data Mining
- Machine Learning
- Intelligent Data Analysis
- Swarm Intelligence

Methods II: 18 ECTS
- Data Warehousing
- Advanced Topics in DB
- In-Memory Technologies
- Information Retrieval

Models: 12 ECTS
- Bayesian Networks
- Neural Networks
- Fuzzy Systems

Fundamentals +Applications: 30++ ECTS
- Very Large Business Applications
- Recent Topics in Business Inf
- Multimedia Retrieval
- Multimedia and Security
- CRM/RecSys
- Recommender Sys: Methods & Applications
- Teamprojects WIF I, WIF III
- Seminars + Teamprojects of DBSE, DKE, KMD, AMSL
(Attention: Only some topics fit!)

and more
Focus "Data Science Methods"

- Get a solid understanding on learning methods
  - Methods I: 18
- Get a solid understanding on data management
  - Methods II: 18
- Master some modeling technologies
  - Models: 12
- Understand business applications
  - Applications: 12

Spread your block judiciously between
- learning methods (see: Example plan for "Mining")
- data management (see: Example plan for "Big Data")

Prof. Myra Spiliopoulou – Knowledge Management & Discovery
Make a plan NOW!

1. Find modules
2. Assign each module you chose to one of the thematic areas
3. Write down your plan and cross-check that you have the right number of modules in each thematic area!
4. When you register for the exam of a course, pick your plan and make sure that you assign the course to the correct thematic area.
5. ...

Personalized Plan of Studies

Prof. Myra Spiliopoulou – Knowledge Management & Discovery
Write down the plan for your studies

1. Find modules
   ✓ Go through the modules offered, according to the LSF
   ✓ Read the module descriptions (web pages) and
   ✓ Drop by at the first one or two meetings
   ✓ Make sure you have the background needed to attend the course – ASK the teacher if you are not sure

2. Assign each module you chose to one of the thematic areas
Write down the plan for your studies

1. Find modules
2. Assign each module you chose to one of the thematic areas
   - You find the mapping of modules to thematic areas in the DKE module handbook.

   **The LSF also lists the areas to which a module belongs, but this is often obsolete. IGNORE it!**

   **The DKE module handbook is on German, but the index is on English. You can use the index.**
Write down the plan for your studies

1. Find modules

2. Assign each module you chose to one of the thematic areas
   - You find the mapping of modules to thematic areas in the DKE module handbook.
   - Make sure that you assign only as many modules to an area as are permitted.

For example, you cannot assign 30 ECTS to Applications.
Write down the plan for your studies

1. Find modules

2. Assign each module you chose to one of the thematic areas
   - You find the mapping of modules to thematic areas in the DKE module handbook.
   - Make sure that you assign only as many modules to an area as are permitted.
   - If a module can be assigned to more than one area, check:
      - Is it a seminar or a teamproject?
        Then, the thematic area depends on the concrete topic.
Write down the plan for your studies

1. Find modules

2. Assign each module you chose to one of the thematic areas
   - You find the mapping of modules to thematic areas in the DKE module hand book.
   - Make sure that you assign only as many modules to an area as are permitted.
   - If a module can be assigned to more than one area, check:
     - Is it a seminar or a teamproject?
       Then, the thematic area depends on the concrete topic.

There are default areas for seminars & teamprojects, for example:
- most seminars/teamprojects with the word "business" in the name belong to APPLICATIONS.
- most seminars/teamprojects on databases belong to Methods II.
- ALL seminars/teamprojects that look like software engineering belong to Fundamentals.
Write down the plan for your studies

1. Find modules

2. Assign each module you chose to one of the thematic areas

   - You find the mapping of modules to thematic areas in the DKE module hand book.

   - Make sure that you assign only as many modules to an area as are permitted.

   - If a module can be assigned to more than one area, check:
     - Is it a seminar or a teamproject? Then, the thematic area depends on the concrete topic.
     - If it is a course (e.g. Swarm Intelligence), then choose one of the permitted thematic areas carefully!
Write down the plan for your studies

1. Find modules

2. Assign each module you chose to one of the thematic areas

3. Write down your plan and cross–check that you have the right number of modules in each thematic area!
Example template for PLAN OF STUDIES

<table>
<thead>
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<th></th>
<th>Fundamentals</th>
<th>Models</th>
<th>Methods I</th>
<th>Methods II</th>
<th>Applications</th>
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</thead>
<tbody>
<tr>
<td><strong>Sem 1</strong></td>
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<td><strong>Sem 3</strong></td>
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</tbody>
</table>

- **30 ECTS**
- **90 ECTS**

Sem 4: Master thesis

Name

Date
Write down the plan for your studies

1. Find modules
2. Assign each module you chose to one of the thematic areas
3. Write down your plan and cross-check that you have the right number of modules in each thematic area!
4. When you register for the exam of a course in HISQIS: Consult your plan of studies!
   - Is the course's area, as is in your plan, also listed in HISQIS?

   YES: Click into the area you want.

Do not forget to click the area you want! Each course has a default area. If you click nothing, you get the default.
Write down the plan for your studies

1. Find modules
2. Assign each module you chose to one of the thematic areas
3. Write down your plan and cross-check that you have the right number of modules in each thematic area!
4. When you register for the exam of a course in HISQIS: Consult your plan of studies!
   - Is the course's area, as is in your plan, also listed in HISQIS?
     YES: Click into the area you want.
     NO: Cross-check into the latest version of the module hand book!
     • If HISQIS disagrees with the module hand book: go to the Examinations Office and ask for help
Write down the plan for your studies

1. Find modules
2. Assign each module you chose to one of the thematic areas
3. Write down your plan and cross-check that you have the right number of modules in each thematic area!
4. When you register for the exam of a course in HISQIS:
   Consult your plan of studies!

➢ Is the course's area, as is in your plan, also listed in HISQIS?

**YES:** Click into the area you want.

**NO:** Cross-check into the latest version of the module hand book!
• If your plan disagrees with the module hand book, you must change your plan!
Write down the plan for your studies

1. Find modules
2. Assign each module you chose to one of the thematic areas
3. Write down your plan and cross-check that you have the right number of modules in each thematic area!
4. Register to the course exams according to your plan of studies.
5. After the exam, check in HISQIS:
   - Is your course (and the ECTS) assigned in the area you wanted?
     - YES
     - NO: Pick the printout of your enrollment and ask for help.
Write down the plan for your studies

1. Find modules
2. Assign each module you chose to one of the thematic areas
3. Write down your plan and cross-check that you have the right number of modules in each thematic area!
4. Register to the course exams according to your plan of studies.
5. After the exam, check in HISQIS:

Is your course (and the ECTS) assigned in the area you wanted?

YES

NO: Pick the printout of your enrollment and ask for help.
Write down the plan for your studies

1. Find modules
2. Assign each module you chose to one of the thematic areas
3. Write down your plan and cross-check that you have the right number of modules in each thematic area!
4. Register to the course exams according to your plan of studies.
5. After the exam, check in HISQIS whether the courses are assigned as you wanted them.

6. At each semester, UPDATE your plan of studies according to the most recent version of the module hand book.
Frequently Asked Questions on the Choice of Modules
Q1: Are all modules I can choose in LSF?

Answer: NO

- Modules are being added each semester:
  If you look now, you do not necessarily see all modules of the next semester.
- Seminars and individual projects are not listed (see later Q)
Q2: Can I enroll to any further module I find?

Answer: NO

- Modules must fit thematically
- Some modules that fit thematically are not permitted, e.g. early bachelor modules

⇒ Get permission before enrolling

Never enroll to a module for which you have no prior approval! You risk that you cannot have the credits counted.
Q3: Can I make an internship during my studies?

ANSWER:

• You can do an internship if you want,
• but it is not part of your studies!

IMPLICATIONS:

1. The company may ask for a verification that an internship is part of your studies.

2. If you need a visum to do the internship, the visa-issuing authority will ask for a verification that an internship is part of your studies.

You cannot get such a verification. Under no circumstances.
Q3: Can I make an internship during my studies?

ANSWER:

• You can do an internship if you want,
• but it is not part of your studies!

We can certify that the specific internship is good for your further study, but IF AND ONLY IF:

➢ The internship fits excellently into one area of your studies, and in this area you still must make ECTS.
Q3: Can I make an internship during my studies?

ANSWER:

• You can do an internship if you want,
• but it is not part of your studies!

We can certify that the specific internship is good for your further study, but IF AND ONLY IF:

➢ The internship fits excellently into one area of your studies, and in this area you still must make ECTS.

Example 1: You have still open ECTS in the area Methods I, and you got an internship to work on the analysis of a web-commerce log.

In that case, the Studies Coordinator can verify that an internship will be good for your studies.
Q3: Can I make an internship during my studies?

ANSWER:

• You can do an internship if you want,
• but it is not part of your studies!

We can certify that the specific internship is good for your further study, but IF AND ONLY IF:

➢ The internship fits excellently into one area of your studies, and in this area you still must make ECTS.

Example 2: You want to write your master thesis on distributed databases, and you got an internship on security issues for distributed data processing.

In that case, only the supervisor of your master thesis can verify that an internship will be good for your studies.

Do not apply for an internship, unless you are sure that it fits to the rest of your studies.
Q3: Can I make an internship during my studies?

ANSWER:

• You can do an internship if you want,
• but it is not part of your studies!

We can certify that the specific internship is good for your further study, but IF AND ONLY IF:

➢ The internship fits excellently into one area of your studies, and in this area you still must make ECTS.

Do not apply for an internship, unless you are sure that it fits to the rest of your studies.
Q4a: Can I spend part of my studies at another University?

ANSWER:
Yes, you can use either
• the Erasmus exchange programme or
• one of our bilateral exchange programmes.

BEWARE: Restrictions apply!
Q4b: How do I make sure that my ECTS from my semester abroad are taken over?

1. Prepare a learning agreement between OVGU and the target university **BEFORE** you leave.
   - Choose the modules carefully.
   - Map the modules to the thematic areas.
   - Make sure that the Credit Points agree.

2. Get the learning agreement approved by your Studies Advisor and have it filed in the Examinations Office

3. Get the learning agreement approved by the target university

4. Report any changes to the learning agreement, as soon as you encounter them, and have the changes approved (see Step 2)
Q5: What kinds of modules are there?

Modules in Master DKE:

- Eligible courses that fit to the thematic areas of Master DKE
- 6 ECTS per course (5 or less ECTS possible)

Course Types offered in the FIN:

- Vorlesung mit Übung
- Scientific Seminar
- Team Project
- Individual Project
- ...

Individual projects:
- are not listed in LSF
- are designed individually for each student

→ Ask the Faculty members for individual projects they offer
Q6: How many team projects can I enroll to?

ANSWER: At least one!
- no explicit limit
- must fit to thematic area (see issues 1-3)
- must give 6 ECTS each
Q6: How many scientific seminars can I enroll to?

**ANSWER:**
- no explicit limit
- must fit to thematic area (see issues 1-3)
- must give 6 ECTS each
Taking over ECTS/courses from your previous studies

! NOT POSSIBLE !
Examinations
Examinations for Master students

Each module must be completed with an exam.

What types of exam are there?

- Oral examination – mündliche Prüfung
- Written examination – Klausur
- Homework – Hausarbeit

Type of exam depends on module.  

ASK: teacher
Examinations for Master students

When planing the 1st exam for a course, BEWARE:

- NO automatic enrollment – YOU must take action!
- There are enrollment deadlines; if you miss a deadline, you cannot enroll.
- You can cancel an enrollment until 7 days before exam.

BEWARE:

- At most three tries per course.
- You can have three tries for three courses total. For all other courses you have two tries.
- No way of stepping back from the exam of a course!
Examinations for Master students: Repetitions

If you fail the first try for an exam:

- You have **AT MOST TWO** more tries.
- These tries are subject to deadlines!

**BEWARE:**
No way of stepping back from the exam of a course!

ASK:
Studies Coordinator,
Exam Office
Examinations for Master students: Repetitions

If you fail the first try for an exam:

- You have **AT MOST TWO** more tries.
- The enrollment to the 2nd try is often done automatically, so make sure you do not miss the **2nd try**.

**BEWARE:**
No way of stepping back from the exam of a course!

Q: I have heard that I **CAN** replace a course, in which I failed, with another.

A: You can replace a master seminar with another *master* seminar.
   You can replace a bachelor seminar with another *bachelor* seminar.
   You can replace a teamproject with another *teamproject*.
   You can replace an IndvProject with another *IndvProject*.

and this is all.
How much to study?
Data Science is fascinating – the more of it the better

Q 1: Can I enroll to more courses than 90 ECTS?
A: Perhaps. Get approval before enrolling!

Extra courses appear in your Transcript of Records in a separate field. So, you have evidence that you passed them.

BUT

Extra courses are not counted in the final grade.
Data Science is fascinating – the more of it the better

Q2: I have enrolled to more than 90 ECTS. What now?

A: Courses are sorted by 1st exam, earliest first, and the ECTS sum up. As soon as 90 ECTS are reached, the remaining courses are extra courses.

The courses are sorted by the 1st exam, and the ECTS are summed up, even if you did not pass the exam.

- The ECTS you will get from a course are counted as soon as you had an exam for it. They are already reserved for you. This is a consequence of the fact that you cannot step down from an exam.
Getting Advice
You can get advice from:

1. Studies Coordinator
2. Coordinator for International Students: Dr. Claudia Krull
3. Examinations Office
4. FARAFIN Students
You can get advice from:

1. Studies Coordinator
2. Coordinator for International Students: Dr. Claudia Krull
3. Examinations Office
4. FARAFIN Students

Establish contact to FARAFIN!

FARAFIN is the Students' Board of the faculty of Computer Science (FIN).
They are students.
They are already familiar with the studies here.
They are volunteers who support other students in their studies.
They organize several events – from time management courses to come-together parties.
They also have a mentoring programm for international Master students.
Studies Coordinator

Prof. Myra Spiliopoulou
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R135
http://www.kmd.ovgu.de/

Arrange meetings with
silke.reifgerste@ovgu.de

Studies Vice-Coordinator

Prof. Andreas Nürnberg
andreas.nuernberger@ovgu.de

http://www.findke.ovgu.de/
Which Studies Coordinator to contact?

Prof. Myra Spiliopoulou
myra@iti.cs.uni-magdeburg.de
R135
http://www.kmd.ovgu.de/

1. Advice for choosing modules
2. Advice for making plans of studies
3. Crosscheck of module mappings (seminars, projects)
4. Arbitrary questions