

Modulliste

für den Masterstudiengang

Data & Knowledge Engineering



**an der
Otto-von-Guericke-Universität Magdeburg
Fakultät für Informatik**

vom Sommersemester 2016



Der Masterstudiengang Data & Knowledge Engineering (DKE)

Der DKE ist ein forschungsorientierter Masterstudiengang für Absolventen mit einem Bachelor- oder Diplomstudienabschluss. Sein Ziel ist, die Studierenden zu einer selbstständigen Forschungs- und Entwicklungstätigkeit im Gebiet des Studiengangs zu befähigen. Sie werden vertraut mit den Methoden, sowie der Arbeits- und Denkweise des Data & Knowledge Engineering und erwerben die Fähigkeit, die erlernten Methoden und Modelle an neue Problemstellungen anzuwenden und anzupassen.

Insbesondere erwerben sie die notwendigen Kompetenzen, um

- Aufgaben zur Extraktion von Wissen aus Daten zu lösen,
- Vorgänge zur Entscheidungsfindung durch Datenanalyse zu realisieren,
- komplexe Probleme der Datenverarbeitung zu bewältigen und zwar für konventionelle wie auch für multimediale Daten, und
- Lösungen zu Aufgaben der Informationsgewinnung, -speicherung und -wiedergabe zu entwerfen und zu realisieren.

Dazu erwerben sie Fachwissen zu den Modellierungsansätzen und den Methoden des Data & Knowledge Engineering und Einsichten zu den vielfältigen Anwendungsthemen dieses Fachgebiets.

Der Abschlussgrad berechtigt zur Bewerbung für ein Promotionsvorhaben.



Structure of the Master DKE

The Master DKE is organized across five thematic areas. Students must acquire a minimum of credit points (CPs) in each of these areas (see Table 1 below). Depending on their preferences, they should acquire more CPs in selected areas up to a maximum number. In particular:

- 1.) Thematic area „Underpinnings“ – 30 CP: choose modules on basics of data mining, database processing, data/image/multimedia engineering
- 2.) Thematic area „Models“ – at least 12 and at most 24 CP: choose modules on knowledge representation, knowledge modeling and knowledge processing
- 3.) Thematic area „Methods I“ – at least 12 and at most 24 CP: choose modules on knowledge discovery, artificial intelligence, machine learning
- 4.) Thematic area „Methods II“ – at least 12 and at most 24 CP: choose modules on information processing and retrieval
- 5.) Thematic area „Applications“ – at least 12 and at most 24 CP: choose modules on applications of Data & Knowledge Engineering, including business applications, medical applications, engineering applications and core computer science applications (like security or image understanding)
- 6.) Each student must participate in at least one team project (6 CP) related to a topic on Models, Methods, Applications or a combination of the above.

A recommendation on the scheduling of the five thematic areas, and an example selection of courses for „Underpinnings“ is given in Table 1.

A larger list of modules is given in Table 2, together with a mapping of each listed module to one or more of the thematic areas; the letters „w“ and „s“ stand for „winter term“, resp. „summer term“. A module usually fits to more than one thematic areas; a capitalized letter („W“, resp. „S“) indicates the best fitting thematic area for a specific module.

Both tables are indicative, since new modules may be added to the curriculum. Especially the seminars offered change quite frequently in order to cover recent research trends. If you identify a module in our faculty that you consider proper for the DKE but is not in the list, please consult the DKE Studies Advisor *before* enrolling to it.



Please remark: Some modules might fit to Master DKE conceptually but are not appropriate for a master degree. The most obvious examples are modules of the early semesters of the Bachelor degrees. Please consult the DKE Studies Advisor *before* enrolling!

Table 1. Scheduling the Master DKE

| Nr. | | 1. Term (CP) | 2. Term (CP) | 3. Term (CP) | 4. Term (CP) | Σ |
|-----|--|-----------------|-----------------|-----------------|-----------------|------------|
| 1. | Thematic Area „Underpinnings“ (30 CP) | | 30 | | | 30 |
| 1.1 | Data Mining | | 5 | | | |
| 1.2 | Machine Learning | | 5 | | | |
| 1.3 | Intelligent Data Analysis | | 5 | | | |
| 1.4 | Information Retrieval | | 5 | | | |
| 1.5 | Data Bases II | | 5 | | | |
| 1.6 | Fundamentals of Computer Vision | | 5 | | | |
| 1.7 | Visualization | | 5 | | | |
| 1.8 | Scientific seminars | | 5-6 | | | |
| | | | | | | |
| | Advanced Thematic Areas (60 CP) | | 30 | 30 | | 60 |
| 2. | Models (12-24 CP) | | | | | |
| 3. | Methods I (12-24 CP) | | | | | |
| 4. | Methods II (12-24 CP) | | | | | |
| 5. | Applications (12-24 CP) | | | | | |
| | | | | | | |
| 6. | Master Thesis (30 CP) | | | | 30 | 30 |
| | | | | | | |
| | Σ CP | 30 | 30 | 30 | 30 | 120 |



**Auflistung der Bereiche innerhalb des Studienganges
inklusive der darin vorgesehenen Module:**

1. BEREICH "FUNDAMENTALS"

ADVANCED TOPICS OF KMD
APPLIED DISCRETE MODELLING
CLEAN CODE DEVELOPMENT
DATA MINING
DATENBANKIMPLEMENTIERUNGSTECHNIKEN
DISTRIBUTED DATA MANAGEMENT
FUZZY-SYSTEME
HUMAN-LEARNER INTERACTION
INFORMATION RETRIEVAL
INTELLIGENTE DATENANALYSE
MACHINE LEARNING
ORGANIC COMPUTING
SCRUM-IN-PRACTISE
SWARM INTELLIGENCE
TOPICS IN ALGORITHMICS
VISUALISIERUNG
WISSENSCHAFTLICHES TEAMPROJEKT KMD

2. BEREICH "MODELS"

ADVANCED DATABASE MODELS
ALGEBRAISCHE SPEZIFIKATION
ALGORITHM ENGINEERING
APPLIED DISCRETE MODELLING
BAYESSCHE NETZE
COMPUTATIONAL CREATIVITY
EINFÜHRUNG IN DIE ANGEWANDTE ONTOLOGIE
FUZZY-SYSTEME
INTRODUCTION TO SIMULATION
KATEGORIEN THEORIE FÜR INFORMATIKER
MODELLIERUNG MIT UML, MIT SEMANTIK
NEURONALE NETZE
VERIFIKATION UND VALIDATION
WISSENSCHAFTLICHES INDIVIDUALPROJEKT

3. BEREICH "METHODS I"

ADVANCED TOPICS IN MACHINE LEARNING
ADVANCED TOPICS OF KMD
BAYESSCHE NETZE
CUSTOMER RELATIONSHIP MANAGEMENT / RECOMMENDER SYSTEMS
ENTDECKEN HÄUFIGER MUSTER
HUMAN-LEARNER INTERACTION
INTELLIGENTE TECHNIKEN: DATA MINING FOR CHANGING ENVIRONMENTS
INTELLIGENTE TECHNIKEN: WEB AND TEXT MINING



NEURONALE NETZE
ORGANIC COMPUTING
RECOMMENDER SYSTEMS: METHODS AND APPLICATIONS
SELECTED TOPICS IN IMAGE UNDERSTANDING
SWARM INTELLIGENCE
WISSENSCHAFTLICHES TEAMPROJEKT KMD

4. BEREICH "METHODS II"

ADVANCED TOPICS IN DATABASES
ADVANCED TOPICS OF KMD
BIG DATA - STORAGE & PROCESSING
DATA WAREHOUSE-TECHNOLOGIEN
DATENBANKIMPLEMENTIERUNGSTECHNIKEN
DISTRIBUTED DATA MANAGEMENT
GEOMETRISCHE DATENSTRUKTUREN
INFORMATION RETRIEVAL
IN-MEMORY-TECHNOLOGIEN UND ANWENDUNGEN 1
IN-MEMORY-TECHNOLOGIEN UND ANWENDUNGEN 2
INTERAKTIVES INFORMATION RETRIEVAL
MULTIMEDIA RETRIEVAL
TRANSAKTIONSVERWALTUNG
WISSENSCHAFTLICHES TEAMPROJEKT KMD

5. BEREICH "APPLICATIONS"

ADVANCED TOPICS OF KMD
APPLIED DISCRETE MODELLING
ASSISTENZROBOTIK
BIOINFORMATIK
BIOMETRICS AND SECURITY
BIOMETRICS PROJECT (MULTI-MODAL DATA ANALYSIS PROJECT: BIOMETRICS)
COMPUTATIONAL INTELLIGENCE IN GAMES
CUSTOMER RELATIONSHIP MANAGEMENT / RECOMMENDER SYSTEMS
DATA MANAGEMENT FOR ENGINEERING APPLICATIONS
EINFÜHRUNG IN MANAGEMENTINF.-SYSTEME
FLOW VISUALIZATION
FORTGESCHRITTENE METHODEN DER MEDIZINISCHEN BILDANALYSE
INDUSTRIAL 3D SCANNING
MANAGEMENT OF GLOBAL LARGE IT-SYSTEMS IN INTERNATIONAL COMPANIES
MULTIMEDIA AND SECURITY
PRAKTIKUM IT SICHERHEIT
PROZESSMANAGEMENT
QUALITÄTSMANAGEMENTSYSTEME
RECOMMENDER SYSTEMS: METHODS AND APPLICATIONS
SELECTED CHAPTERS OF IT SECURITY 1
SELECTED CHAPTERS OF IT SECURITY 2
SELECTED CHAPTERS OF IT SECURITY 3
SELECTED CHAPTERS OF IT SECURITY 4
SERVICE ENGINEERING
SOFTWARE-DEVELOPMENT FOR INDUSTRIAL ROBOTICS



OTTO VON GUERICKE
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MAGDEBURG

INF

FAKULTÄT FÜR
INFORMATIK

STARTUP-ENGINEERING II
STARTUP-ENGINEERING III
STEUERUNG GROSSER IT-PROJEKTE
STUDENT CONFERENCE
THREE-DIMENSIONAL & ADVANCED INTERACTION
VLBA 1: SYSTEMARCHITEKTUREN
VLBA 2: SYSTEM LANDSCAPE ENGINEERING
WISSENSCHAFTLICHES TEAMPROJEKT KMD

6. MASTERARBEIT

MASTERARBEIT