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## Lecture, Course and Project Descriptions

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This document contains lecture course and project descriptions in English offered by the *Institute of Information Science (IWS)* of the Faculty of Information and Communication Science.

These descriptions consist of a short list of the course contents as well as the intended learning outcomes. In addition, the credits, the frequency and the name of the lecturer are given. The lectures are sorted according to the different study programs of the *IWS*. These are:

- B. Sc. Data and Information Science
- M. Sc. Data and Information Science
- B. A. Digital Journalism and Media
- M.Sc. Market and Media Research
- B. A. Library Studies and Digital Communication

**NOTE:** Please make sure you checked the terms (winter term, summer term) before booking a course into your learning agreement. Also check if a course is “bookable upon request only”. In this case, contact Prof. Dr. Rinsdorf before you finalize your Learning Agreement.

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## 1. Data and Information Science (B.Sc.)

### Search Engine Technology

Course No:	17.1
Name:	Search Engine Technology
Terms:	Winter Semester
Credits:	3
Instructor:	Prof. Dr. Philipp Schaer

#### **Learning outcomes**

**(WHAT)** Students can set up their own search engine for a given, (semi-)structured data set, configure it and adapt it to different requirements. They analyze the performance of the systems and their components in order to identify and implement potential for improvement.

**(HOW)** With the help of standard software libraries such as Solr and trec\_eval, the own search engine is installed, configured and extended.

**(WHY)** Later, students will be able to use the tools and processes for any data and applications (e.g. intranet, websites, product catalogs or e.g. log data).

#### **Contents**

Students will learn how to set up a typical search engine installation and how to prepare and perform indexing with standard software such as Solr, Elasticsearch etc. The students will also learn how to use a search engine indexing tool. In addition to a search index and interface, these software packages also provide extensive REST interfaces. After the successful indexing of any data set, the focus is on the processing of multiple queries with shell scripts or small Python programs. Later, the search engine will be configured and extended. The evaluation of the results according to the cranfield paradigm is practiced prototypically using a test collection.

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## Data Modeling

Course No:	08.1
Name:	Data Modeling
Terms:	Winter Semester
Credits:	6
Instructor:	Prof. Dr. Philipp Schaer

### **Learning outcomes**

**(WHAT)** Students learn to process and structure data and information that is available in electronic form and to convert it into common formats.

**(HOW)** For this they use different formats (e.g. CSV, XML or JSON), automated transformations (e.g. with XSLT or on the command line) and editors (e.g. Notepad++).

**(WHY)** This enables them to process any source data in such a way that it can be used for later applications, e.g. as input for database and retrieval systems or for data mining. They know typical procedures, tools and formats to use the results of their preparation and modelling flexibly. Furthermore, they can adapt them according to the application and requirements.

### **Contents**

In this course, procedures, tools and formats for the preparation, structuring and transformation of arbitrary data and information are presented and their practical use in laboratory practical courses are practiced. The focus is on the various steps necessary to bring any digital data and information into a uniform form and to enable structured further processing. Furthermore, methods for the automated transformation of data (e.g. with regular expressions, XSLT or small scripts) into various formats (e.g. CSV, XML, JSON) using text editors (e.g. Notepad++) are discussed. In addition to the theoretical basics of data structures (lists, trees, etc.), practical skills in the different types of data and information retrieval from the Web (databases, Web APIs, scraping) and data cleansing (consistency checks, harmonization, etc.) are taught. A series of experimental (e.g. XPath) as well as methods and tools already in professional use will be presented and evaluated using practical examples.

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## Information Analysis

Course No: 15  
Name: Information Analysis  
Terms: Winter Semester  
Credits: 6  
Instructor: Prof. Ragna Seidler-de Alwis, MBA

### **Learning outcomes**

**(WHAT)** Students learn to identify strengths and weaknesses of markets and especially companies & organizations

**(HOW)** with the help of secondary sources and the use of dynamic and elaborated research techniques by studying methods and techniques of information analysis with a strong practical orientation

**(WHY)** to identify and analyze possible challenges and risks for companies & organizations & markets & industries and corresponding trends

### **Contents**

- Systematic survey and evaluation of secondary sources (data and information sources)
- Reading of academic papers
- Research methods of market & industry data and company information including refinement, analysis and interpretation
- Success factors of in depth information analysis
- Facts and figures for a company analysis and first steps relating to a market & competitive analysis

## Market and Business Intelligence

Course No:	23b
Name:	Market and Business Intelligence
Terms:	Summer Semester
Credits:	6
Instructors:	Prof. Ragna Seidler-de Alwis, MBA Prof. Dr. Gernot Heisenberg

### **Learning outcomes**

The students are enabled to apply the knowledge acquired in the lectures, in order to further develop their competencies in the area of Market & Business Intelligence.

**(WHAT)** The students are technically enabled to carry out a systematic survey and analysis of data and information under market and competition aspects. That concludes extensive knowledge of relevant data and information sources. They can identify peculiarities in large amounts of data from corporate and market data, which are used for the pioneering role of a company in a specific market segment,

**(HOW)** by applying methods and tools of market and competitive analysis, including demanding data and information searches and by statistically analyzing, validating and optimizing (mostly non-hypothesized) data volumes as well as new unknown market and company data,

**(WHY)** in order to use the extensive analyzes and results models forecasts for market success derive, scrutinize and question them and use the findings as a basis for decision-making (e.g. Investment decision support for the management) and to derive trends.

### **Contents**

- Market analysis including methods and models
- Competition analysis including methods and models
- Knowledge Management and Business Intelligence basics
- Cross Industry Standard Process for Data Mining (CRISP-DM )
- Data selection
- Data preparation
- Predictive Analytics methods
- Modeling, validation and interpretation
- Selection of methods and applying on an own use case
- Reporting

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## Big data

Course No:	21a
Name:	Big Data
Terms:	Winter Semester
Credits:	6
Instructors:	Prof. Dr. Gernot Heisenberg

### **Learning outcomes**

The course teaches the basics and techniques for analysing large amounts of data using neural networks. In addition to their size, these data can be characterised by four further features: high variability, continuous and massive growth and high complexity. In this module, students are taught the techniques and methods required to analyse the data. The learning outcomes are as follows:

(WHAT) Students are enabled to understand and assess the characteristics, potentials and risks of big data and to systematically plan and implement the analysis of mass data under specific conditions.

the analysis of mass data under specific economic and scientific questions,

(HOW) by being able to pre-process, clean and transform data with Python, understand, apply and optimise analysis methods such as neural networks and deep learning and analyse real, large data sets, visualise, interpret and report results,

(WHY) in order to derive recommendations for action and decisions from the knowledge gained from extensive analyses and result models and to prepare them for science and business.

### **Contents**

- Neural networks
- Tensors and tensor operations
- Stochastic gradient descent
- Back propagation
- Feed forward networks
- Deep learning approaches
- Convolutional and recurrent neural networks (CNN & RNN)
- Training, testing, and validation
- Deployment
- Over-/Underfitting:
- Jupyter notebooks (python)
- Application examples (computer vision, text analysis, sequence analysis)

## 2. Digital Sciences: Data and Information Science (M.Sc.)

With its modularity, the Master's programme offers a wide range of courses taught in English. Since the scope of this offer would go beyond the scope of this document, reference is hereby made to the web resource of the study programme.

There, you will find a list of the courses offered in English as well as a detailed description of the course contents.

Please visit:

<https://digital-sciences.de/en/overview/modules/index.html>



### 3. Digital Journalism and Media (B.A.)

#### Search Engine Technology

Course No:	M 43.2
Name:	Search Engine Technology
Terms:	Winter Semester
Credits:	4
Instructor:	Prof. Dr. Gernot Heisenberg

#### **Learning outcomes**

**(WHAT)** You can perform most complex research tasks on the web,

**(HOW)** by formulating your specific user information needs in a structured way, as well as iteratively match the possibilities and limitations of search engine technology (by understanding crawling, parsing, indexing, ranking, rendering, and interaction with the user) and creating and applying a complex research concept,

**(WHY)** in order to lubricate targeted relevant information from a lot of information that otherwise, due to its size, cannot be processed by human, cognitive filter options.

#### **Contents**

- Search Engine Technology Basics
  - Fundamental functionalities of algorithmic universal search engines
  - Ranking by relevance criteria
  - Analysis of Search Engine Result Pages (SERP)
- Optimization and Evaluation
  - Query optimization
  - Evaluation of search engine result quality
- Advanced Search Engine Technologies
  - Search Engines for social media content
  - Ambient findability
  - Semantics

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## Innovation Management

Course No:	OR72.a
Name:	Innovation Management
Terms:	Summer Semester ( <a href="#">course is only bookable upon request</a> )
Credits:	6
Instructor:	Prof. Dr. Lars Rinsdorf

### ***Learning outcomes & contents***

In this module you learn to develop and enhance innovative editorial concepts for specific target groups from a user centered perspective. You get in touch with different useful tools in editorial strategy development, in particular design thinking, and you are able to apply them to a particular project. Moreover, you learn to define, manage, and lead innovation processes in organizations like media companies applying agile management tools. You learn to apply different research methods on editorial issues and to make editorial decisions based on empirical results.

## 4. Market and Media Research (M.Sc.)

### User Experience

Course No:	MM3.3
Name:	User Experience
Terms:	Winter Semester (course is only bookable upon request)
Credits:	3
Instructor:	Prof. Dr. Amelie Duckwitz

### *Learning Outcomes*

(WHAT) The students acquire theoretical knowledge in the (UX) in order to be able to apply it practically, to reflect on it and to use it as a basis for optimization processes.

(HOW) By getting to know UX basics as well as by gaining an overview of the methodological approaches and identifying the application fields of UX on the basis of current issues, as well as practically applying what they have learned.

(WHY) To get the acquired theoretical and empirical evaluation competence to transfer research results to practice to make methodologically validated and reflected decisions about optimization processes.

### Contents

The students learn the theoretical background and process of user experience design and methods by means of concrete practical examples. They learn which research questions they need to ask in the analysis phase, how to reconcile user data and needs with business objectives and how to and translate them into concrete, technically and economically feasible concepts. They apply current tools of digital (rapid) prototyping and reflect on the UX process.

## 5. Library Studies and Digital Communication (B.A.)

### Library Management

Course No: 3.2.1  
Name: Library Management (30 h contact time | 60 h self-study)  
Terms: Winter semester  
Credits: 3  
Instructor: Prof. Dr. Simone Fühles-Ubach

#### **Learning Outcomes**

**(WHAT)** Students can

- assess the different perspectives of management in a differentiated way,
- use the management cycle and its phases for target and strategy planning
- carry out portfolio analyses, SWOT analyses, environmental environment analyses and stakeholder analyses
- develop your own library strategies with mission statement, mission, vision and critical success factors using various methods (KGSt, PRUB, IOOI).
- evaluate embedded librarian and liaison librarian as strategy concepts
- do benchmarking with similar institutions, analysis and evaluation (library monitor, own Excel dashboard)
- systematically collect and record data from different areas of the library and use it to calculate key figures for different library areas (library metrics)
- evaluate and assess library data (internal or external) (library assessment)

**(HOW)** They do this by collecting, structuring, and evaluating and analyzing the data which are pre-determined in the library context and which arise during use (internal data) and which are also consulted by the supporting institutions (external data) according to various criteria.

**(WHY)** By analyzing external and internal data, students are in a position to develop quantitative and qualitative objectives for the planning process in libraries and to accompany the organization and control of the process. In addition, comprehensive and long-term planning can be formulated in a library strategy.

#### **Contents**

Starting with the basics of management, the dimensions and instruments of management are first presented. The management cycle is then introduced as a core process for all operational control issues and simultaneously as a central element of strategy development.

Portfolio analyses, environmental environment analyses and stakeholder analyses are also considered in the context of strategy development for libraries.

Students get to know several ways of creating a strategy for public enterprises (KGSt, PRUB; IOOI). The concepts of embedded librarians and liaison librarians are taught as partial strategies.

Basic concepts of controlling are supplemented by practical exercises on benchmarking with data from the German Library Statistics (library monitor). Library Metrics as extended work with key figures for all library areas - stock, stock usage, library usage - replaces the previous performance measurement. Library Assessment, which is designed to learn as much as possible about user and non-user needs and assesses how well these needs are supported, is conducted to improve library locations, services and resource utilization.

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## Personnel management

Course No: 3.2.2  
Name: Personnel management (30 h contact time | 60 h self-study)  
Terms: Winter semester  
Credits: 3  
Instructor: Prof. Dr. Simone Fühles-Ubach

The students get to know the areas of personnel management and personnel management as well as their different functions and tasks. The focus is on the development and justification of an employee-oriented personnel management for the different sizes and requirements in libraries and the different types of libraries. The acquired knowledge enables the students to design their own personnel measures.

- Basics and influencing factors of personnel management
- Economy- and behavior-oriented theory approaches (motivation, leadership and relationship)
- Strategic personnel work
- Recruitment, personnel planning, personnel development
- Personnel development and leadership relationships
- Staff appraisals

The event will be enhanced by guest lectures.

Prerequisites for participation: -

Type of module examination:

Homework or written exam

Individual services: Examination or term paper; the result is 50% of the module grade.

Mandatory module, evaluated