

<b>Module Title:</b>	<b>Big Data</b>	
<b>Module No.:</b> DLMBBD	<b>Semester / Term:</b> --	<b>Duration:</b> Minimum 1 Semester
<b>Module Type(s):</b> Wahlpflicht	<b>Regularly offered in:</b> WS, SS	
<b>Workload:</b> 300 h	<b>Credit Points:</b> 10	
<b>Admission Requirements:</b> None	<b>Language of Instruction:</b> Englisch	
<b>Contributing Courses to Module:</b> <ul style="list-style-type: none"> <li>• Data Utilization (DLMBBD01)</li> <li>• Application Scenarios and Case Studies (DLMBBD02)</li> </ul>	<b>Workload:</b> Self-study: 200 h Self-examination: 50 h Tutorials: 50 h	
<b>Course Coordinator(s) / Tutor(s):</b> Please see the current list of tutors on the Learning Management System.	<b>Module Director:</b> Prof. Dr. Markus C. Hemmer	
<b>References to Other Programs:</b> <ul style="list-style-type: none"> <li>• Master of Business Administration</li> </ul>	<b>References to Other Modules in the Program:</b> <ul style="list-style-type: none"> <li>• Corporate Finance</li> </ul>	

**Qualification and Educational Objectives of the Module:**

## Data Utilization:

Upon successful completion, students are able

- to understand how identity, similarity and diversity of data can be utilized in problem-solving approaches.
- to differentiate between complicated and complex systems of investigation.
- to identify the variability of a problem under investigation.
- to differentiate between invariant and dynamic features of an investigated system.
- to synthesize the gained insights to propose a reliable data analytics solution.

## Application Scenarios and Case Studies:

Upon successful completion, students are able

- to establish an application scenario for data science within a self-organized team.
- to identify requirements and appropriate technologies for data collection.
- to evaluate and select applicable technologies for data pre-processing and processing.
- to assess challenges and risks of the selected approach.
- to clearly define the outcome and value of the approach.
- to elaborate a conceptual design document and a presentation for decision-makers.

**Course Content of the Module:**

## Data Utilization

- Pattern Recognition
- Natural Language Processing
- Image Recognition
- Detection and Sensing
- Problem Solving
- Decision-making

## Application Scenarios and Case Studies:

- Workflow overview
- Fields of application
- Sprint Planning; Sprint
- Sprint Retrospective
- Committee Presentation

**Teaching Methods:**

See the contributing course outlines

**Literature:**

See the contributing course outlines

**Percentage of the Module Grade Relative to the Final Grade for the Program:**

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**Prerequisites to Qualify for Assessment:****Assessment:**

See the contributing  
course outlines

**DLMBBD01:**  
Exam, 90 min. (50 %)  
**DLMBBD02:**  
Written Assessment:  
Case Study (50 %)

<b>Course No.:</b> Data Utilization	<b>Course Title:</b> DLMBBD01	<b>Hours Total:</b> 150 h
		<b>Credit Points:</b> 5 ECTS
<b>Course Type:</b> Wahlpflicht <b>Course Availability:</b> <b>Course Duration:</b> Minimum 1 Semester	<b>Admission Requirements:</b> None	
<b>Course Coordinator / Instructor:</b> See current list of tutors in the Learning Management System	<b>References to Other Modules:</b> Please see module description	

## **Course Description:**

The course Data Utilization introduces case-based applications that take advantage of regularities and patterns found within continuously generated texts, images, or sensor data. The cases solve issues of pattern recognition, natural language processing, image recognition, detection and sensing, problem solving, and decision support. The cases are related to the application fields of cybersecurity, linguistics, augmented reality, intelligent transportation, problem solving, and decision support.

## **Course Objectives and Outcome:**

Upon successful completion of the course, students are able

- to understand how identity, similarity and diversity of data can be utilized in problem-solving approaches.
- to differentiate between complicated and complex systems of investigation.
- to identify the variability of a problem under investigation.
- to differentiate between invariant and dynamic features of an investigated system.
- to synthesize the gained insights to propose a reliable data analytics solution.

## **Teaching Methods:**

The learning materials include printed and online course books, vodcasts, online knowledge tests, podcasts, online tutorials, and case studies. This range of learning materials is offered to students so they can study at a time, place, and pace that best suits their circumstances and individual learning style.

## **Course Content:**

- 1. Introduction**
  1. The Meaning of Identity, Similarity, and Diversity
  2. Data Patterns and Ontologies
- 2. Pattern Recognition**
  1. Analysis of User Interaction, Attitude, and Behavior
  2. Predictive Analytics
  3. Preventing the Unknown: User Behavior Analytics in Cybersecurity
- 3. Natural Language Processing**
  1. Concepts of Natural Language
  2. Speech Recognition and Acoustic Modelling
  3. Discerning the Meaning: Linguistics and Social Media
- 4. Image Recognition**
  1. Basics of Image Representation
  2. Integral Transforms and Compression
  3. Exploiting the Visual: Image Recognition for Augmented Reality
- 5. Detection and Sensing**
  1. Sensor Construction and Techniques
  2. Intelligent Agents and Surveillance
  3. Managing the Complex: Sensor Networks in Intelligent Transportation Systems
- 6. Problem Solving**
  1. Knowledge Sharing and the Cloud
  2. Rule-Based Systems
  3. Learning from Nature: Expert Systems in Business
- 7. Decision Support**
  1. Invariants, Determinants, and Alternatives in Decision-Making
  2. Correlation and Causality in Strategic Decision-Making
  3. Approaching the Crossroads: Dashboards and Visualization

**Literature:****Recommended Literature:**

- Strong, C. (2015). *Humanizing Big Data: Marketing at the Meeting of Data, Social Science and Consumer Insight*. London: Kogan Page.
- Wheeler, S.R. (2016). *Architecting Experience: A Marketing Science and Digital Analytics Handbook*. Singapore: World Scientific Publishing.
- Farzindar, A., Inkpen, D., Hirst, G. (2017). *Natural Language Processing for Social Media*. 2nd ed. San Rafael, CA: Morgan & Claypool Publishers.
- Bajcsy, P., Chalfoun, J., Simon, M. (2017). *Web Microanalysis of Big Image Data*. Berlin: Springer.
- Hsu, H., Chang, C., & Hsu, C. (Eds) (2017). *Big Data Analytics for Sensor-Network Collected Intelligence*. Cambridge, MA: Academic Press.
- Delen, D. (2015). *Real-World Data Mining: Applied Business Analytics and Decision Making*. New York: Person.

An actual list with course-specific mandatory reading as well as references to further literature is available in the Learning Management System.

**Examinations:**

- Exam, 90 min.

**Student Workload (in hours): 150**

Self-study: 90 h  
Self-testing: 30 h  
Tutorials: 30 h

<b>Course No.:</b> DLMBBD02	<b>Course Title:</b> Application Scenarios and Case Studies	<b>Hours Total:</b> 150 h
		<b>Credit Points:</b> 5 ECTS
<b>Course Type:</b> Wahlpflicht <b>Course Availability:</b> <b>Course Duration:</b> Minimaldauer 1 Semester	<b>Admission Requirements:</b> None	
<b>Course Coordinator / Instructor:</b> See current list of tutors in the Learning Management System	<b>References to Other Modules:</b> Please see module description	

## **Course Description:**

This course provides an opportunity for students to work on application scenarios for data science in selected industry sectors.

The course uses an eduScrum approach for self-organized learning. The lecturer takes over the role of the Product Owner and acts as servant leader to the student teams. Student Teams consist of 4-5 members, one of which is assigned the role of the eduScrum Master for his team.

Besides an introduction to eduScrum, Sprint planning and Sprint retrospective, all classes are performed as Sprints by Student Teams, to achieve the goal as defined in the Product Backlog, which is maintained by the Product Owner (lecturer). The course closes with delivery of a design document and a final presentation in front of a committee of selected lecturers.

## **Course Objectives and Outcome:**

Upon successful completion of this course, students are able

- to establish an application scenario for data science within a self-organized team.
- to identify requirements and appropriate technologies for data collection.
- to evaluate and select applicable technologies for data pre-processing and processing.
- to assess challenges and risks of the selected approach.
- to clearly define the outcome and value of the approach.
- to elaborate a conceptual design document and a presentation for decision-makers.

## **Teaching Methods:**

The learning materials include printed and online course books, vodcasts, online knowledge tests, podcasts, online tutorials, and case studies. This range of learning materials is offered to students so they can study at a time, place, and pace that best suits their circumstances and individual learning style.

## **Course Content:**

### **1. Workflow Overview**

1. Introducing the eduScrum Approach
2. eduScrum Events and Artefacts
3. Definition of Time Boxes (stand up, planning, retrospective)
4. Team Formation and Selection of eduScrum Masters
5. Requirements and Acceptance Criteria

### **2. Fields of Application**

1. Overview on Fields of Application:
2. Selection of either of the fields (1 per team)
3. Summary of Product Backlogs

### **3. Sprint Planning**

1. Sprint Planning Meeting
2. Definition of Done

### **4. Sprint**

1. Sprint stand-up meeting
2. Sprint item processing

### **5. Sprint Retrospective**



**Literature:****Recommended Literature:**

- Drake, M. J. (2013). The Applied Business Analytics Casebook: Applications in Supply Chain Management, Operations Management, and Operations Research. New York: Pearson.
- Simon, P. (2013). Too Big to Ignore: The Business Case for Big Data. Hoboken, NJ: Wiley.
- Delhij, A., van Solingen, R., & Wijnands, W. (2015). The eduScrum Guide [online]. Available from: [http://eduscrum.nl/file/CKFiles/The\\_eduScrum\\_Guide\\_EN\\_1.2\(1\).pdf](http://eduscrum.nl/file/CKFiles/The_eduScrum_Guide_EN_1.2(1).pdf) [Accessed May 15, 2018].
- Schwaber, K., Sutherland, J. (2017). The Scrum Guide. [Online]. Available from: <https://www.scrumguides.org/docs/scrumguide/v2017/2017-Scrum-Guide-US.pdf> [Accessed May, 15, 2018].

An actual list with course-specific mandatory reading as well as references to further literature is available in the Learning Management System.

**Examinations:**

- Written Assessment: Case Study

**Student Workload (in hours): 150**

Self-study: 110 h

Self-examination: 20 h

Tutorials: 20 h