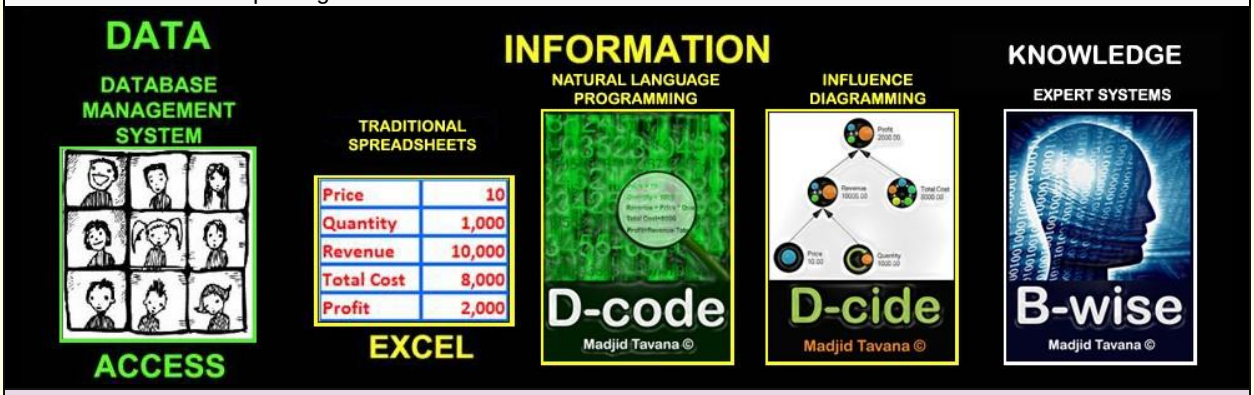
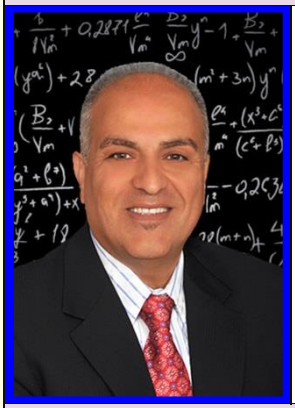
Universität Paderborn Fakultät WiWi **Modulhandbuch** *Module Manual*	**W33651** **Information Technology for Decision Making** **English**
Koordinator: *Coordinator*	Prof. Dr. Guido Schryen, Prof. Dr. Madjid Tavana
Lehr- und Forschungseinheit: *Teaching Unit*	Wirtschaftsinformatik insb. Operations Research
Auskünfte: *Information*	Prof. Dr. Guido Schryen, Prof. Dr. Madjid Tavana
Credits/ECTS:	5
Module HomePage:	http://tavana.us/paderborn
Zeitmodus *Semester*	Summer Semester

Kurzbeschreibung / *Short Description*

This course is about the manager's responsibilities for problem solving and decision making, and those areas in which information technology can be used to gain the insight needed to support selection of decision alternatives. Students learn about the role of data, information, and knowledge in managerial problem solving and decision making. Transactional processing and database management systems (DBMS) are used to store, manage, and retrieve data in organizations. Decision support system (DSS) tools and technologies (such as natural language programming and influence diagramming) are used to organize data into information for decision analytics. Expert systems (ES) are used to synthesize information into knowledge for knowledge management. Students are required to use DBMS, DSS and ES software packages in a hands-on environment.



Lehrer / *Instructor*



Madjid Tavana is Professor and Distinguished Chair of Business Analytics at La Salle University, where he serves as Chairman of the Business Systems and Analytics Department. He also holds an Honorary Professorship in Business Information Systems at the University of Paderborn in Germany. Dr. Tavana is Distinguished Research Fellow at the Kennedy Space Center, the Johnson Space Center, the Naval Research Laboratory at Stennis Space Center, and the Air Force Research Laboratory. He was recently honored with the prestigious Space Act Award by NASA. He holds an MBA, PMIS, and PhD in Management Information Systems and received his Post-Doctoral Diploma in Strategic Information Systems from the Wharton School at the University of Pennsylvania. He has published 21 books and over 300 research papers in international scholarly academic journals. He is the Editor-in-Chief of *Healthcare Analytics (Elsevier), International Journal of Applied Decision Sciences*, *International Journal of Management and Decision Making*, *International Journal of Communication Networks and Distributed Systems*, *International Journal of Knowledge Engineering and Data Mining*, *International Journal of Strategic Decision Sciences*, and *International Journal of Enterprise Information Systems.*

Lehrveranstaltungen (Teilmodule) / *courses (module elements)*

Module 1: Database Management Systems
Upon completion of prescribed work for this module, the student should be able to:
1. Discuss relational database management systems (DBMS)
2. Explain the difference between redundancy and duplication
3. Eliminate redundancy through table splitting
4. Eliminate repeating groups in databases
5. Effectively create a DBMS with tables, relationships and queries in MS Access

Module 2: Strategic Information Systems
Upon completion of prescribed work for this module, the student should be able to:
1. Demonstrate ability to collaborate within a diverse group of students and make complex decisions
2. Effectively collect data and use FONDA (Filtering, Organizing, Normalizing, Deciding, and Analyzing)
3. Effectively use SWOT analysis to organize data into Strenegths/Opportunities and Weaknesses/Threats
4. Construct a euclidean model to classify alternatives into four quadrants (Low Risk-Low Return, Low Risk-High Return, High Risk-Low Return, and High Risk-High Retrn)
5. Effectively formulate recommendations and write a comprehensive group consulting report

Module 3: Decision Support Systems and Traditional Spreadsheet Modeling
Upon completion of prescribed work for this module, the student should be able to:
1. Discuss decision support systems (DSS)
2. Perform what-if analysis
3. Perform trial and error
4. Perform goal seeking
5. Formulate mathematical optimization problems
6. Effectively use SOLVER to solve optimization problems in MS Excel

Module 4: Decision Support Systems and Natural Language Programming
Upon completion of prescribed work for this module, the student should be able to:
1. Discuss natural language programming (NLP)
2. Discuss non-procedural programming languages
3. Explain the role of NLP in financial and operational modeling
4. Write natural language programs
5. Effectively use NLP software like D-code and dynamic data exchange

Module 5: Decision Support Systems and Influence Diagramming
Upon completion of prescribed work for this module, the student should be able to:
1. Discuss influence diagramming (ID)
2. Explain the difference between constant, variable, self-reference variable, and series in ID
3. Effectively model and solve ID problems with D-cide
4. Effectively use dynamic data exchange between D-cide and excel

Module 6: Knowledge Engineering and Expert Systems
Upon completion of prescribed work for this module, the student should be able to:
1. Discuss knowledge engineering and expert systems (ES)
2. Explain the difference between knowledge representation techniques (i.e., decision tables, decision trees, and structured English)
3. Explain rule-based ESs
4. Represent rule-based ESs with decision trees
5. Effectively use ES software like B-wise

Empfohlene Voraussetzungen / *prerequisites*

Working knowledge of Microsoft Excel

Kombinationshinweise - Überschneidungen / *overlapping modules*

Die Kombination mit folgenden Modulen ist nicht zulässig / *it is not feasible to combine with these modules*:
Erläuterungen / *comments*: None

Prüfungsmodalitäten / *Assessments*

Case Reports (60%):

Access Case Analysis (12%): A PowerPoint Presentation with Problem Description, Initial Table, Redundant Attributes, Split Tables, Key and Non-Key Attributes, Relationships, and Query (see the sample Access case on Canvas for more details).

Excel Case Analysis (12%): A PowerPoint Presentation with Problem Description, Excel Spreadsheet, Solver

Formulation, and Optimal Solution (see the sample Excel case on Canvas for more details).

D-code Case Analysis (12%): A PowerPoint Presentation with Problem Description, D-code Model Lines (Text NOT Screenshot), D-code Solution Screenshot, and Embedded Excel Solution (see the sample D-code case on Canvas for more details).

D-cide Case Analysis (12%): A PowerPoint Presentation with Problem Description, Influence Diagram Screenshot, D-cide Solution Screenshot, and Embedded Excel Solution (see the sample D-cide case on Canvas for more details).

B-wise Case Analysis (12%): A PowerPoint Presentation with Problem Description, A listing of Conditions and Actions, and B-wise Decision Tree Screenshot (see the sample B-wise case on Canvas for more details).

Course Project (40%): A multi-disciplinary project designed to solve a complex real-life strategic information problem (i.e., Doctors Without Borders/Médecins Sans Frontières or Banking in Emerging Economies) using Strategic Assessment Systems and the Euclidean Model.

Lernziele / *learning objectives*

1. Discuss the emerging technological issues facing managers **(LO-1)**.
2. Explain the value of data, information, and knowledge to organizations **(LO-2)**.
3. Utilize information technology tools to design operational, managerial, and strategic systems **(LO-3)**.
4. Utilize a series of decision analytics tools in a hands-on environment **(LO-4)**.
5. Design and develop Database Management Systems, Management Information Systems, Decision Support Systems, Strategic Information Systems, and Expert Systems in support of the organizational decision making and problem solving **(LO-5)**.
6. Discuss when and how Management Support Systems may be used to complement more analytic decision-making frameworks **(LO-6)**.
7. Demonstrate ability to effectively use PowerPoint for presenting data and compelling storytelling **(LO-7)**.
8. Demonstrate ability to collaborate within a diverse group of people and make complex decisions **(LO-8)**.

Module	Module Learning Outcomes	Course Learning Outcomes							
		LO-1	LO-2	LO-3	LO-4	LO-5	LO-6	LO-7	LO-8
1	1. Work within a diverse group of people and make complex decisions	X	X						X
	2. Collaborate within a group in an online environment	X	X						X
2	1. Discuss relational database management systems (DBMS)	X	X	X	X	X			
	2. Explain the difference between redundancy and duplication	X	X	X	X	X			
	3. Eliminate redundancy through table splitting	X	X	X	X	X			
	4. Eliminate repeating groups in databases	X	X	X	X	X			
	5. Effectively create a DBMS with tables, relationships, and queries in MS Access	X	X	X	X	X		X	
3	1. Discuss decision support systems (DSS)	X	X	X	X	X	X		
	2. Perform what-if analysis	X	X	X	X	X	X		
	3. Perform trial and error	X	X	X	X	X	X		
	4. Perform goal seeking	X	X	X	X	X	X		
	5. Formulate basic and intermediate mathematical optimization problems	X	X	X	X	X	X		
	6. Effectively use SOLVER and solve intermediate optimization problems in MS Excel	X	X	X	X	X	X		
4	1. Formulate complex mathematical optimization problems	X	X	X	X	X	X		
	2. Effectively use SOLVER and solve complex optimization problems in MS Excel	X	X	X	X	X	X	X	
5	1. Discuss natural language programming (NLP)	X	X	X	X	X	X		
	2. Discuss non-procedural programming languages	X	X	X	X	X	X		
	3. Explain the role of NLP in financial and operational modeling	X	X	X	X	X	X		
	4. Write natural language programs	X	X	X	X	X	X		
	5. Effectively use NLP software like D-code and dynamic data exchange	X	X	X	X	X	X	X	
6	1. Discuss influence diagramming (ID)	X	X	X	X	X	X		
	2. Explain the difference between constant, variable, self-reference variable, and series in ID	X	X	X	X	X	X		
	3. Effectively model and solve intermediate ID problems with D-cide	X	X	X	X	X	X		
7	1. Effectively model and solve complex influence diagramming (ID) problems with D-cide	X	X	X	X	X	X	X	
	2. Effectively use dynamic data exchange between D-cide and excel	X	X	X	X	X	X		
8	1. Discuss knowledge engineering and expert systems (ES)	X	X	X	X	X			
	2. Explain the difference between knowledge representation techniques (i.e., decision tables, decision trees, and structured English)	X	X	X	X	X			
	3. Explain rule-based ESs	X	X	X	X	X			
	4. Represent rule-based ESs with decision trees	X	X	X	X	X			
	5. Effectively use ES software like B-wise	X	X	X	X	X		X	

Schlüsselqualifikationen / ***(soft) skills***
1. Problem Formulation 2. Presentation Skills 3. Report Writing
Methodische Umsetzung / ***methodic implementation***
1. Relational Database Management Modeling 2. Mathematical Optimization 3. Natural Language Programming 4. Influence Diagramming 5. Multi-Criteria Decision Analysis 6. Decision Tables 7. Decision Trees 8. Structured English 9. Knowledge Engineering 10. Rule-Based Expert Systems
Unterrichtssprache / ***teaching language***
English
Ablaufinformationen, Terminplan, etc. / ***practical implementation, schedule***
25 x 60 min (Block lecture exp. May 2020)
Lernmaterialien, Literaturangaben / ***learning material, literature***
Lecture notes and reading materials will be provided by the instructor in electronic form
Bemerkungen / ***comments***
None