Course description

Blue colored text indicates areas where you have to add content

Name of applicant: [*insert your name here*]

Course of studies: [*insert your course of studies here (e.g. "Information Systems")]*

University*:* [*insert the name of the university you studied at*]

Grade Average: [*insert your average grade on a scale of 1 to 5 with 1 being the best, i.e. 100% = 1,0; 75% = 2,0; 0% = 5,0*]

*Please **refresh** the index when you have finished the description!*

Table of contents

Please categorize your lectures into the following four categories:
- *Information Systems,*
- *Computer Science,*
- *Quantitative Methods, and*
- *Business Administration*

1 [Category]

1.1 [Course: *Insert your courses here*]

Structure

Use this structure as a template/ copy the boxes from the example in order to add courses in your document.

Example (template):

1. [*headline/content of chapter one*]

   1.1. [*headline/content of first subchapter*]

   1.2. […]

2. [*headline/content of chapter one*]

   2.1. […]

Literature

Example (template):

- *[Surname], [first letter of given name]. ; [Surname], [first letter of given name]. : [Title]. [Subtitle]. [xth edition]., [place of publication] [year].*

Example (applied):

- Winskel, G.: The Formal Semantics of Programming Languages, 5th edition, Cambridge 2001.

Additional Information

ECTS: [*insert the amount of ECTS concerning this lecture*]

Contact hours (*semester periods per week*):

- Lecture: [*insert the amount contact hours spent for lecture*]
- Tutorial: [*insert the amount contact hours spent for tutorial*]
- **SUM:** **[*Total amount of contact hours*]**

2 Information Systems (process modeling)

This is just an exemplary lecture of the Bachelor's program at the WWU Münster.

2.1 Data management

Structure

1. Conceptual data models by means of the entity-relationship-method
   - 1.1. Purpose of conceptual data models
   - 1.2. Basic elements within ERM
   - 1.3. Usage of cardinalities by means of the "Min-Max-notation"
     - 1.3.1. Syntax
     - 1.3.2. Combination possibilities and their interpretation
   - 1.4. Hierarchies and structures in an ERM
     - 1.4.1. Hierarchies and trees
     - 1.4.2. Structures and networks
   - 1.5. Attributes in an ERM
     - 1.5.1. Attributes as keys
   - 1.6. Multivalent relationship types
   - 1.7. Reinterpretation of relationship types
   - 1.8. Generalization and specialization in an ERM
   - 1.9. Special conventions of ER-modeling
     - 1.9.1. Denotation of relationship types
     - 1.9.2. The concept of "time" in an ER-model
     - 1.9.3. Conventions concerning cardinalities
     - 1.9.4. Conventions concerning generalization and specialization
2. Transformation of ER-models into data base schemata
   - 2.1. Transformation of entity types
   - 2.2. Transformation of relationship types
   - 2.3. Transformation of generalizations and specializations
     - 2.3.1. Non disjunctive – partial
     - 2.3.2. Non disjunctive – total
     - 2.3.3. Disjunctive – total
     - 2.3.4. Disjunctive – partial
     - 2.3.5. Alternative transformation approaches

3. Data base normalization
    3.1. First normal form
        3.1.1. Functional dependencies
        3.1.2. Procedure for transforming into first normal form
    3.2. Second normal form
        3.2.1. Procedure for transforming into second normal form
    3.3. Third normal form
        3.3.1. Procedure for transforming into third normal form
    3.4. Fourth normal form
        3.4.1. Multivalent dependencies
    3.5. Fifth normal form
4. Structured Query Language (SQL)
    4.1. SQL as a standard
    4.2. Purposes
    4.3. Designators
    4.4. Values
        4.4.1. Character chains
        4.4.2. Numbers
        4.4.3. NULL-values
    4.5. Data types
        4.5.1. Numerical data types
        4.5.2. Time-related data types
        4.5.3. Character chain-related data types
    4.6. Creation of tables (CREATE TABLE)
    4.7. Modification of the table structure (ALTER TABLE)
    4.8. Removal of tables (DROP TABLE)
    4.9. Insertion of data (INSERT)
        4.9.1. Direct insertion
        4.9.2. Insertion from other tables
    4.10. Queries (SELECT)
        4.10.1. Simple queries
        4.10.2. Generation of preconditions (WHERE)
        4.10.3. Sorting (ORDER BY)
        4.10.4. JOIN-syntax
        4.10.5. Data aggregation
        4.10.6. Building of groups (GROUP BY)
        4.10.7. Conditions within groups (HAVING)
        4.10.8. The order of query processing
        4.10.9. Sub-queries
    4.11. Modification of data (UPDATE)
    4.12. Deletion of data (DELETE)

5. Data base synchronization and transactions
   - 5.1. Synchronization of data base processes
   - 5.2. Transactions (ACID)
     - 5.2.1. Atomicity
     - 5.2.2. Consistency
     - 5.2.3. Isolation
     - 5.2.4. Durability
   - 5.3. Anomalies with competing accesses to data
     - 5.3.1. Dirty read
     - 5.3.2. Lost update
     - 5.3.3. Non-repeatable read
     - 5.3.4. Phantom read
   - 5.4. Serializability of transactions
     - 5.4.1. Read-lock and write-lock
     - 5.4.2. Two-phase-protocol
6. Dispositive data management systems – data warehouses
   - 6.1. Structure of a data warehouse
   - 6.2. Established data warehouse schemata
   - 6.3. Data warehouse model on function specification level

Literature

- Becker, J.; Schütte, R.: Handelsinformationssysteme. 2nd Edition, Landsberg 2004.
- Vossen, G.: Datenmodelle, Datenbanksprachen und Datenbankmanagementsysteme. 5th Edition, Oldenbourg 2008.
- Scheer, A.-W.: ARIS, Modellierungsmethoden, Metamodelle, Anwendungen. 4th edition, Berlin 2001.

Additional Information

ECTS: 5

Contact hours (semester periods per week):

• Lecture:	2
• Tutorial:	2
• **SUM:**	**4**

Please follow this example and add all lectures related to the field of 'Information Systems' before you continue with the second category: 'Computer Science'

3 Computer Science (data modeling and software engineering)

3.1 Programming

This is just an exemplary lecture of the Bachelor's program at the WWU Münster.

Structure

1. Introduction
   - 1.1. Classification of programming languages
   - 1.2. Aims of programming
2. Object-oriented programming (with Java)
   - 2.1. First java programs and features
   - 2.2. Basic types and operations
   - 2.3. Arrays
   - 2.4. Control structures
   - 2.5. Object orientation and programming on large-scale
   - 2.6. Graphical user interfaces (GUI)
   - 2.7. Inner classes
   - 2.8. Exception handling
   - 2.9. Generic types
   - 2.10. Loops applied to collections
   - 2.11. Automated pack and upack
   - 2.12. Enumeration types
   - 2.13. Data files
   - 2.14. Value- vs. reference-semantics
   - 2.15. Java memory administration
   - 2.16. Applets
   - 2.17. Concurrency
   - 2.18. General programming principles
3. Declarative/functional programming (with Haskell/Curry)
   - 3.1. Definition of functions
   - 3.2. Definition of types
   - 3.3. Pattern-matching
   - 3.4. Type-inference
   - 3.5. Functions of a higher rank
   - 3.6. Lazy evaluation

3.7. Accumulation within parameters

4. Semantics of imperative programming languages (by means of imperative language “IMP”)
   4.1. Syntax of IMP
   4.2. Reduction-semantics of IMP
   4.3. Machine-semantics of IMP

Literature

Java:

- Krüger, G.: Handbuch der Java-Programmierung, Studentenausgabe, München 2007.

Haskell:

- Chakravarty. M.; Keller, G.: Einführung in die Programmierung mit Haskell, München 2004.
- Thompson, S.: Haskell - The Craft of Functional Programming, 2nd edition, Harlow 2003.
- Bird, R.: Introduction to Functional Programming using Haskell, 2nd edition, London 1998.

Semantics:

- Winskel, G.: The Formal Semantics of Programming Languages, 5th edition, Cambridge 2001.

Additional Information

ECTS: 10

Contact hours (semester periods per week):

• Lecture:	4
• Tutorial:	2
• **SUM:**	**6**

Please follow this example and add all lectures related to the field of ‘Computer Science’ before you continue with the second category: ‘Quantitative Methods’

4 Quantitative Methods (Operations research and statistics)

This is just an exemplary lecture of the Bachelor's program at the WWU Münster.

4.1 Operations research

Structure

1. Graphs and trees
   - 1.1. Relations and graphs
   - 1.2. Shortest ways within graphs
   - 1.3. Trees
   - 1.4. Critical path analysis
2. Linear optimization (linear programming)
   - 2.1. Basics (questions and solutions)
   - 2.2. Simplex algorithm
   - 2.3. Two-phase-method
   - 2.4. Sensitivity analysis
   - 2.5. Duality and the dual simplex algorithm
3. Integer optimization
   - 3.1. Linear programming including integrity constraints
   - 3.2. Issues of transport
   - 3.3. Issues of allocation
4. Decision optimization and Markov-chains
   - 4.1. Dynamic optimization
   - 4.2. Markov chains
   - 4.3. Markov decision processes
5. Optimization procedures
   - 5.1. Problem classification
   - 5.2. Search procedures
   - 5.3. Simulated annealing
   - 5.4. Genetic algorithms

Literature references

- Kathöfer, U.; Müller-Funk, U.: BWL-Crash-Kurs Operations Research, 2nd edition, Konstanz 2008.
- Bomze, I., Grossmann, W.: Optimierung- Theorie und Algorithmen. Eine Einführung in Operations Research für Wirtschaftsinformatiker, Mannheim 1993.
- Gal, T.: Grundlagen des Operations Research, Part 3, Berlin 1992.
- Neumann, K., Morlock, M.: Operations Research, 2nd edition, München 2002.

Additional Information

ECTS: 10

Contact hours (semester periods per week):

• Lecture:	3
• Tutorial:	2
• Additional qualification - computer supported mathematics:	2
• **SUM:**	**7**

Please follow this example and add all lectures related to the field of 'Quantitative Methods' before you continue with the second category: 'Business Administration'

5 Business Administration

This is just an exemplary lecture of the Bachelor's program at the WWU Münster.

5.1 Fundamentals of accounting

Structure

1. Purpose-orientation of accounting systems
   - 1.1. Subcategorization of economic accountancy
   - 1.2. Purposes of economic accountancy
   - 1.3. Definitions and demarcation
2. Internal accountancy
   - 2.1. Tasks of cost-accounting/activity-accounting
   - 2.2. The structure of cost-accounting/activity-accounting
   - 2.3. Cost-accounting systems
   - 2.4. Cost-type accounting
   - 2.5. Cost-center accounting
   - 2.6. Cost-unit accounting
   - 2.7. Selective cost-accounting procedures
3. External accountancy
   - 3.1. Basics of the annual account
   - 3.2. Reporting procedure
   - 3.3. Valuation
   - 3.4. Profit commission statement
   - 3.5. Additional elements concerning the accounts of stock corporations
   - 3.6. Annual audit
   - 3.7. Financial statement analysis

Literature

- Berens, W.; Flacke, K.; Kraft, M.; Triska, T.: Grundlagen des betriebswirtschaftlichen Rechnngswesens, 3rd edition, Münster 2006.
- Coenenberg, A.: Kostenrechnung und Kostenanalyse, 5th edition, Stuttgart 2003.
- Baetge, J.; Kirch, H.-J.; Thiele, S.: Bilanzen, 8th edition, Düsseldorf 2005.

Additional Information

ECTS: 10

Contact hours (semester periods per week):

• Lecture:	5
• Tutorial:	1
• **SUM:**	**6**

Please follow this example and add all lectures related to the field of 'Business Administration' in order to finalize the course description.