Information Technology

Course
INF-21306 Data Management

Course code	INF-21306
Period	1, mornings (also in period 5)
Contact Person	Gert Jan Hofstede
Lecturers	Gert Jan Hofstede, vacancy
Examiners	Gert Jan Hofstede
Language of instruction	English
Assumed prerequisite knowledge	• Fluency in English, written and oral • At ease with computers • Basic mathematics and set theory
Secretariat	Leeuwenborch building Room 6013 tel: 0317-84157 office.inf@wur.nl

Profile of the course
Aim: to become competent as a manager of data and a worker with data models and databases.
Target group: MSc students from any WU curriculum with an interest in the topic, either research- or management-related.

Benefit for students: In any academic job, facility in communicating with IT people on database design and use is required. This course guarantees that its graduates are conversant where data models and databases are concerned.

Learning outcomes
After successful completion of the course the student is expected to be able to:
- demonstrate a managerial perspective on an organization's memory;
- apply concepts of relational database design including various syntax and diagramming conventions, keys and relations;
- use an Entity/Relationship diagramming tool for designing a database;
- create (meaning design) a database for a realistic problem situation in their field of study;
- construct a relational database in MS Access, MySQL / PHP or in another selected (web-based) database, including integrity constraints;
- construct complex data retrieval queries to a database using SQL (Structured Query Language);

Learning materials and resources
- Textbook: R. Watson (2014) Data Management 6th edition. Springer e-book. A Website for additional material and answers to selected exercises is being maintained by the author: http://www.richardtwatson.com/dm6e/.
- The course makes extensive use of BlackBoard: the course's Blackboard offers all support material: study guide, explanatory texts, self tests, sample exam questions, sample project results of prior teams, links and facilitates the group work.
- Power Point presentations on a.o. Data Modelling, SQL, indexes, architectures, spatial data operations (put on BlackBoard).
- Computer programmes: MS Access, MS Visio, MySQL, PHP, possibly other software.

Educational activities
The course has two main elements.
- The first three weeks centre on tutorial activity, with homework assignments for the book, lectures, plenary Q/A sessions, practicals that use audio-visual materials and exercises, and students working individually on data modelling and SQL.
- The second three weeks centre on team assignments. Each team of 4-5 students has a dedicated supervisor. The students pick a practical assignment to design and build a database, if possible for a real client. They write a report and present it to the other teams half a week before the deadline, to be able to provide and receive feedback.

Assessment strategy

The course is assessed in two complementary ways: an individual exam, and an assessment of the team assignment. Each of these counts for 50% of the final mark. There is a bottom mark for the individual exam of 5.0, and for the team work of 5.5. The individual exam, in its regular form, is in 48-question Multiple Choice format, with 16 general theory questions including various managerial aspects as well as spatial data, 16 questions that involve interpreting SQL statements, and 16 questions that involve data modelling. At re-exams, an open design exam format is used, in which students have to design a database on paper and build SQL queries for it. This allows those students who know how to design and build a database and database queries, but perform poorly on MC exams, to improve themselves.

The team project assessment is based on the database that was constructed and the report made about it. The grading involves six elements that are combined into one final team mark: 1) data modelling, 2) SQL, 3) independence, 4) effort, 5) report quality, 6) elegance & extra features.

The table below links learning outcomes to assessment.

	project	Exam
- demonstrate a managerial perspective on an organization's memory;	x	x
- apply concepts of relational database design including various syntax and diagramming conventions, keys and relations;	x	x
- use an Entity/Relationship diagramming tool for designing a database;	x	x
- create (meaning design) a database for a realistic problem situation in their field of study;	x	
- construct a relational database in MS Access, MySQL / PHP or in another selected (web-based) database, including integrity constraints;	x	x
- construct complex data retrieval queries to a database using SQL (Structured Query Language).	x	x

Principal Themes

The Leitmotiv of the course is that an organized activity – either an organization or a research project – needs a memory, in order to prepare for the future. The assumed role of the student is to be an expert in some application domain (e.g. GIS or Agrotechnology or Business and Consumer studies or BioInformatics), not an Information Technology specialist.

Within this scope, we first study forms of organizational memory – data management in general -, then zoom in on databases. As to databases, we study their entire life cycle, from problem issue to data model to implementation, to data retrieval, to database integrity issues. We also deal with topics of special interest, e.g. bill of materials, spatial databases.

The course does not assume prior knowledge of databases, so we start with three weeks of intense tutorial. For most students however the most valuable element is the team assignment of the second half of the course. This makes them realize the practical implications of the theory, and that besides requiring logic and computer language skills, database design is in large part a matter of communication between designers, domain experts and problem owners.

Chapters are those of the Watson book; we follow its didactical approach in which design and querying are dealt with in an integrated way using exercises and increasing complexity interactively.

Outline and schedule

week	theme	In class	Out of class	
			Self study	project
1	Introduction	2 lectures	Computer-aided tutorial MS Access; Watson Ch 1-3 (before), 4-7 (prepare wk 2)	Create team, brainstorm
2	Database design	2 lectures, classroom exercises	Ch 4-7 (revisit), ch 8-10 (prepare wk 3)	Pick topic, contact would-be clients
3	Advanced SQL	2 lectures, classroom SQL practice	Ch 11-14 selected topics (prepare wk 4)	Write proposal, choose implementation software
4	Architectures, GIS	2 lectures	Ch 18-22 selected topics (prepare wk 5)	Design database, queries
5	Integrity, Database management	1 lecture		Build database, insert data, start report
6	The big picture	Plenary presentation session		Test, present to other teams, finalize
7		exam preparation	Prepare exam	Monday 9:00: deadline
8			Exam	