1. Course Code

2205

2. Course Title

Fundamentals of Database Systems

3. Teacher

WANNOUS, Muhammad

4. Term

Fall 3

5. Course Overview and Objectives

This course covers database design and use in applications. It does NOT cover the design of database engine design. The course begins with a description of the relational model and continues to cover SQL statements. There will be a programming project which covers database design, management, and utilizations. In this projects students show the skills they acquired in the course. SQLite (http://sqlite.org/) is the database engine accompanying this course. It has been selected for its ease of installation, popularity, and support for different platforms.

6. Course Goals (Attainment Targets)

(1) Define a 'database', a 'database management system', and database structure.
(2) Describe a relational database model and SQL syntax
(3) Use the relational model in designing a database
(4) Apply the design using a database engine
(5) Practice using the SQL syntax through the command line
(6) Practice using the SQL syntax through an application

7. Correspondence relationship between Educational goals and Course goals

Educational goals of the school			Course Goals
High level ICT skills	Basic academic skills		(1) (3) (5)
	Specialized knowledge and literacy		(2) (4) (6)
Human skill (Tankyu skill)	Ability to continually improve own strengths		
	Ability to discover and resolve the problem in society	Problem setting	
		Hypothesis planning	
		Hypothesis testing	
		Practice	
	Fundamental Competencies for Working Persons	Ability to step forward	
		Ability to think through	
		Ability to work in a team	
Professional ethics			

8. Course Requirements (Courses / Knowledge prerequisite for this course)

This course requires command-line and programming skills. Students are recommended to take this course after 'Foundations of Computer Systems' (2206). Command-line tools in addition to GUI tools are used in this course. The programming project is in Java, but you can use any other programming language that you are comfortable with.

9. Textbooks (Required Books for this course)

For this course, a set of lecture slides, handouts, and reports will be distributed in timely manner through Moodle.

10. Reference Books (optional books for further study)

Getting Started with SQL: A Hand-on Approach for Beginners, Thomas Nield , 1491938617
MySQL, 5th Ed., Paul DuBois, 9780321833877

11. Evaluation

Goals	Evaluation method & point allocation					
	examination	Quiz	Reports	Presentation	Deliverables	Other
(1)		○				
(2)		○				
(3)		○				
(4)					○	
(5)					○	
(6)					○	
Allocation		40			60	

12. Notes

This course contains both theoretical and practical parts. Be prepared for using the shell interface and for coding.
Quizzes and projects have deadlines and they won't be postponed unless a serious issue occurs.

13. Course plan

(Notice) This plan is tentative and might be changed at the time of delivery

Lesson 1: (Course orientation, Introduction to database)
(Discussion and Lecture, 90 minutes)

[1] Course syllabus
[2] Grading
[3] Introduction to SQL
+ What is a database?
+ What is a table?
+ What data types can be set?
+ What is a schema?
+ What is a key?

Lesson 2: (Database types) (Lecture 45 minutes, Practice 45 minutes)

[1] Centralized and lightweight databases
[2] Relational database
[3] SQLite {SQLite Studio}
+ Installation.
+ Creating a db.

Lesson 3: (Basic SQL)	(Lecture 45 minutes, Practice 45 minutes)

[1] Queries
  + Data retrieval.
  + Filtering.
  + Grouping records.

Lesson 4: (Database design)	(Lecture 45 minutes, Practice 45 minutes)

[1] Database entities
[2] Relations

Lesson 5: (Database design)	(Lecture 45 minutes, Practice 45 minutes)

[1] Entity Relation Diagram (ERD)
  + Multi relations

Lesson 6: (Database Creation)	(Lecture 45 minutes, Practice 45 minutes)

[1] Converting an ERD to a database
  + Creating database.
  + Creating tables.
  + Primary and foreign Keys.

Lesson 7: (Managing data)	(Lecture 45 minutes, Practice 45 minutes)

[1] Insert
[2] Delete
[3] Truncate table
[4] Drop table
[5] Joining tables

Lesson 8: (Review)	(Discussion, 90 minutes)

Review of the course.

Lesson 9 : (Indexing)	(Lecture 45 minutes, Practice 45 minutes)

[1] Indexes
  + Creating indexes
  + Performance

Lesson 10 : Connecting to database from applications)

(Lecture 30 minutes, Practice 60 minutes)

[1] Database connector
  + JDBC
[2] Execute SQL statements.

Lesson 11 : (Project work) (Discussion and lab work, 90 minutes)

[1] Work on a sample project to design and create a database
  + Use ERD to design a database for the students, teachers, and courses

Lesson 12 : (Project work) (Discussion and lab work, 90 minutes)

[1] Create the database for the sample project.
[2] Import data into the database.

Lesson 13 : (Project work) (Discussion and lab work, 90 minutes)

[1] Design an application to manage the database of the sample project
  + Use SQLite to create the database.
  + Use Java for writing the application to manage the database.

Lesson 14 : (Project work) (Discussion and lab work, 90 minutes)

[1] Continue working on the application for the sample project.

Lesson 15 : (Wrap up) (Discussion, 90 minutes)

[1] Discuss and review the topics covered in this course.
[2] Suggestions of improvements.