Course Introduction*

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Hanoi University of Technology
Department of Information Systems
Introduction to Database Systems
Student Manual

1 Letter to Student

To the Student:

This course and this Student Manual reflect a collective effort by your instructor, the Vietnam Education Foundation, The Massachusetts Institute of Technology (MIT) Open Courseware Project and faculty colleagues within Vietnam and the United States who served as reviewers of draft of this Student Manual. This course is an important component of our academic program. Although it has been offered for many years, this latest version represents an attempt to expand the range of sources of information and instruction so that the course continues to be up-to-date and the methods well suited to what is to be learned.

This Student Manual is designed to assist you through the course by providing specific information about student responsibilities including requirements, timelines and evaluations.

You will be asked from time-to-time to offer feedback on how the Student Manual is working and how the course is progressing. Your feedback is very important to make sure that things work and make sense with this Student Manual as well as this course. By providing feedback you might be helping other students. Your comments will inform the development team about what is good and what requires attention.

I do hope that you will enjoy the course while learning lots of new concepts and that you'll gain a deeper appreciation of the scientific world.

Thank you for your cooperation.

2 Faculty Listing

- Lecturer: Dr. Nguyen Kim Anh
  - Office Location: Department of Information Systems, C1 - 325
  - Email: anhnk@it-hut.edu.vn[1]
  - Office Hours: 8am-5pm, weekdays
- Assistant: Do Bich Diep
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- Before or after class: 2-4pm Tuesday

3 Resources

- Lecture notes of this course
- Textbook :
  - Vietnamese: Nguyên lý của các hệ cơ sở dữ liệu, Nguyễn Kim Anh, Nhà xuất bản Đại học Quốc Gia Hà Nội, 2004
  - English: Fundamentals of Databases Systems, Elmasri & Navathe, 5th Edition, Addition- Wesley, 2006
- Reference Books:
  - Database Management Systems, Ramakrishnan & Gehrke, 3rd Edition, McGraw-Hill, 2003
  - A First Course in Database Systems, J.D. Ullman, Prentice-Hall, 1997
  - Database Systems: The Complete Book, Garcia-Molina, Ullman, Widom, 1st Edition, 2002, Prentice-Hall
- Web sources:
  - http://pages.cs.wisc.edu/∼dbbook/[3]

4 Course Description

The course Introduction to Database Systems is designed for undergraduate student.

This course is intended to provide student a foundations in database systems with a focus on relational database management systems. The goal of this course is introducing students to data modelling, database design and relational theory, developing the skills in database design using relational data model and in using Structure Query Language for extracting information from the database.

The main topics in this course include data models, database definition and manipulation languages, schema normalization, integrity constraints, storage and indexing techniques, query processing, query optimization, concurrency control and transaction managements.

5 Course Objectives

At the end of this course, students should be able to:

- develop accurate data models
- demonstrate a familiarity with the fundamental concepts and the architecture of relational database management systems
- master in using SQL for manipulating database queries
- develop skills in database design using the relational model
- understand the concepts and typical techniques behind transaction and concurrency control
- apply the queries processing and indexing techniques.

6 Prerequisites

For HUT students, the formal pre-requisite for this course is Introduction to Computer Science.

Solid background in programming languages and data structures would be the advantages for studying this course.

[3] http://pages.cs.wisc.edu/∼dbbook/

7 Course Calendar

Week	Topics/ Readings	Readings	Works
1	Database Concepts	Ref: Chapter 1 of Vietnamese textbook [V] Chapter 1 & 2 of English textbook [E]	
2	Data modeling using ER model	Ref: Ch. 2- 2.1 of V; Ch. 3 of E	Theory Exercise 1
3	Relational data model	Ref: Ch 2- 2.2 of V; Ch 5 & Ch 7- 7.1 of E	Theory Exercise 2
	Mapping from ER model to Relational model		
4	Relational Algebra	Ref: Ch. 3- 3.1 of V; Ch 6 of E	Homework 1 is out
	Relational Calculus	Ref: Ch.3 – 3.2/3 of V; Ch 6 of E	
5	QBE	Ref: Ch. 3- 3.7 of V; Ch. Appendix C of E	Theory Exercise 3
	SQL I: data definitions	Ref: Ch. 3- 3.8 of V; Ch. 8 of E	
6	SQL II: queries , updates	Ref: Ch. 3- 3.8 of V; Ch. 8 of E	Submit homework 1
7	Functional dependencies	Ref: Ch. 4 – 4.1/2 of V; Ch.10 & Ch.11 of E	Homework 2 is out
	Decomposition		Theory Exercise 4
	Normal forms		Project released
8	Normalization algorithms	Ref: Ch.4- 4.3/4 of V; Ch. 11 of E	Theory Exercise 5
	Multivalues dependencies and 4th normal form		

continued on next page

9	Storage and Indexing	Ref: Ch.5 of V; Ch. 13 & 14of E	Theory Exercise 6
			Submit homework 2
10	Query processing and Optimization	Ref: Ch.6 of V ; Ch. 15 of E	Theory Exercise 7
11	Database Security	Ref: Ch.7 of V ; Ch. 23 of E	
12	Introduction to Transactions and Concurrency control	Ref: Ch. 8 of V; Ch. 17 & Ch.18 of E	Theory Exercise 8
13	Project presentation		
14	Project presentation		
15	Revision		

Table 1

8 Grading Procedure

Activities	Percentages
Homeworks	20%
Project	30%
Final Exam	50%

Table 2

There are two homeworks in this course. The first homework is out in week 4 and is due at the end of week 6. The second one is out in week 7 and is due at the end of week 9. Each of this homework weight 10%.

There is a research group project. Each group should have 3-4 students. A group can choose one from a list of research topics, studying the provided document, writing a report and preparing a presentation. The project is evaluated based on the report (15%) and the presentation (15%).

9 Exam

There will be a one and a half hours closed-book written exam for this course during the University exam period. The written exam might consist of a mixture of descriptive questions, small exercises involving relational algebra, SQL, QBE, relational database design exercise.

10 Collaboration Policy

For the theory exercises and homeworks, you are allowed to discuss your answers with other students, but please write up your own answers. Copying solutions from other students is never allowed. For the group project, your will work in teams and hand in only one written report. However, the report should include the detail of tasks assigned for each member in the group.