

DATABASE SYSTEMS - CO2013

Online, Mon (13:00-15:50)

Online, Thu (08:00-10:50)

Facebook: click [here](#)

BKEL: <http://e-learning.hcmut.edu.vn/>

Course structure:

Credit:	4 (3.2.8)		
Total Contact Hours:	75	Lectures: 45 Labs: 30 Self-studying: 8 x 15 class hours	
Major	Computer Science & Engineering		
Assessment:	Score 1:	10%	Assignment 1
	Score 2:	20%	Assignment 2
	Score 3:	20%	Presentations (2 times, 10% each)
	Score 4:	50%	Final open-book-exam (90')
	Score 5:	added to score 3	Bonus

Summary

Introduction to data models and database systems. Relational algebra. Database design theory and methodology. Data storage, indexing, query processing, and physical design. Database security concepts. Structured Query Language (SQL). Introduction to big data concepts, emerging database & data management technologies, and applications.

Textbook

1. R. Elmasri & S.B. Navathe (2017): *Fundamentals of Database Systems*, 7th Edition, Addison-Wesley

Reference

2. A. Silberschatz, H. F. Korth, S. Sudarshan (2019): *Database System Concepts*, 7th Edition, McGraw-Hill

Instructor

- Assoc.Prof.Dr.DANG Tran Khanh (khanh@hcmut.edu.vn, office hours: appointment by email)

Lab information

- Oracle 19c/20c
- Assignment 1: DB Design, ER/EER Mapping, Relational Algebra/Calculus Operations, Normalization, SQL
- Assignment 2: DB Schema Implementation, Advanced SQL/Triggers/Stored Procedures, Database Applications (DB Security, E-commerce/Web-based applications, Mobile Database Applications, etc.)

Schedule

Weeks	Contents	Presentations - Online, Mon (13:00-15:50)	Presentations - Online, Thu (08:00-10:50)	Notes
1, 2 16, 23 Aug 19, 26 Aug	Database System Concepts & Architecture (slides1, slides2) -Introduction to Data Models, Database Systems -Three-Level Architecture & Data Independence -Modern Database Applications	N/A Group list & members: FB	N/A Group list & members: FB	Week 1: Discussing about presentation topics 1 & 2; Forming the presentation groups
2, 3, 4 23, 30 Aug, 06 Sep 26 Aug, 02, 09 Sep	Entity-Relationship (ER) Model (slides1, slides2) -ER Model -ER Model Weaknesses & Introduction to Enhanced ER (EER) Model -Exercises (<i>revision, ERD</i>) -W4 seminar: DB Design Tools (<i>4 big groups</i> , each studies a DB design tool and has 30 minutes to show/demo/discussion)	Week 2.1: bonus – Trúc, Hoa, Đạt (<i>Relational data model & mySQL, slides</i>) → cont. W3 Week 3.1: ER model weaknesses (slides) - G1 Week 3.2: EER model (slides) – G2 Week 4.1: Seminar (DB design tools) <ul style="list-style-type: none">- Group 1: slides- Group 2: slides- Group 3: slides- Group 4: slides	Week 2.1: bonus – Tân’s group (<i>Introduction to DBs, slides</i>) → cont. W4 Week 3.1: ER model weaknesses (slides, clip) - G1 Week 3.2: EER model (slides, clip) – G2 Week 4.1: Seminar (DB design tools) <ul style="list-style-type: none">- Group 1: slides- Group 2: slides- Group 3: slides- Group 4: slides	Further reading: ER.model weaknesses 1st phase of group presentation starts in w3 <i>Week 2.:</i> 4 big groups establishment for w4 seminar <i>Week 3.:</i> <ul style="list-style-type: none">- Monday class: G2 – late slides sibmission (06/09/2021)- Thursday class: G1 – late slides sibmission (06/09/2021) <i>Week 4.:</i> <ul style="list-style-type: none">- Monday class: Big G4 – late slides sibmission (08/09/2021)- Thursday class: BigG1 – late slides sibmission (12/09/2021)
5, 6 13, 20 Sep 16, 23 Sep	Relational Data Model (slides1, slides2) -Relational Data Model & ER/EER-to-Relational Mapping -Relational Algebra & Calculus -Exercises (<i>ERD/mapping</i>)	Week 5.1: Relational data model (slides) – G3 Week 5.2: ER-to-relational mapping (slides) – G4 Week 6.1: EER-to-relational mapping (slides) – G5 Week 6.2: Relational algebra (slides) – G6	Week 5.1: Relational data model (slides) – G3 Week 5.2: ER-to-relational mapping (slides) – G4 Week 6.1: EER-to-relational mapping (slides) – G5 Week 6.2: Relational algebra (slides) – G6	Relational calculus: self-studying
7, 8 27 Sep, 04 Oct 30 Sep, 07 Oct	Structured Query Language (SQL, slides) -DDL -DML -Exercises (<i>ERD/mapping review & SQL</i>)	Week 7.1: SQL – Select clause & simple queries (slides) – G7 Week 7.2: bonus – Khôi’s group (<i>Temporal Database Concepts and Time Series Database, slides</i>) Week 8.1: Oracle stored procedures (slides) – G8 Week 8.2: bonus – Nghĩa’s group (P. , slides)	Week 7.1: SQL – Select clause & simple queries (slides) – G7 Week 7.2: bonus – Thien’s group (<i>SQL naming style and syntax, slides</i>) Week 8.1: Oracle stored procedures (slides) – G8 Week 8.2: bonus – Phuc’s group	SQL – JOIN, AGGREGATION queries: self-studying
9 11 Oct 14 Oct	Database Design Theory & Methodology (slides) -Functional Dependencies -Normalization -Exercises	Week 9.1: FD & Normalization (slides) – G9 Week 9.2: bonus – Chấn Hưng’s group (P. , slides)	Week 9.1: FD & Normalization (slides) – G9 Week 9.2: bonus – Sáng’s group (<i>NoSQL and Firebase Firestore, slides</i>)	
10 18 Oct 21 Oct	Data Storage, Indexing, Query Processing & Physical Design (slides1, slides2, slides3) -Hashing Techniques, B-tree & R-tree families -Introduction to Physical Database Design -Exercises	Week 10.1: B+-tree – G1 (slides) Week 10.2: R*-tree – G2 (slides) Week 10.3: Fundamental concepts of DB security – G3 (slides)	Week 10.1: B+-tree – G1 (slides) Week 10.2: R*-tree – G2 (slides) Week 10.3: Fundamental concepts of DB security – G3 (slides)	2nd phase of group presentation 30 minutes each group Physical DB design: self-studying
11 25 Oct 28 Oct	Introduction to Database Security (slides1, slides2) -Basic Concepts -Access Control: DAC, MAC, RBAC -Data Encryption	Week 11.1: Oracle DAC – G4 (slides) Week 11.2: Oracle MAC/Labels – G5 (slides) Week 11.3: Oracle RBAC – G6 (slides)	Week 11.1: Oracle DAC – G4 (slides) Week 11.2: Oracle MAC/Labels – G5 (slides) Week 11.3: Oracle RBAC – G6 (slides)	30 minutes each group
12 01 Nov 04 Nov	Big Data (slides1, slides2) -Basic Concepts and Applications -Big Data Models -Case Studies (e.g., MongoDB, Oracle NoSQL, etc.) Revision and Research Directions -Research Directions in the Era of Smart Cities and Industry 4.0 -Revision	Week 12.1: Key-Value model – G7 (slides) Week 12.2: Document-stored model – G8 (slides) Week 12.3: Graph-based model – G9 (slides)	Week 12.1: Key-Value model – G7 (slides) Week 12.2: Document-stored model – G8 (slides) Week 12.3: Graph-based model – G9 (slides)	30 minutes each group