

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE
ABET COURSE SYLLABI

IIC2413 DATA BASE

Credits and contact hours:	10 UC credits / 10 hours (3h lectures; 1.5 h assistantships; 5h Individual learning experience (project))
Instructor's name:	Juan Reutter
Course coordinator's name	None
Textbook:	<ul style="list-style-type: none">- García-Molina, H.; Ullman, J.; Widom, J. (2008) <i>Database systems: the complete book</i>. Prentice Hall, 2nd edition.- Date, C.J. (2001) <i>Introducción a loss sistemas de bases de datos</i>. Pearson Education, 7th edition.
Course Catalog Description:	Databases are at the core of commercial application development, and are necessary for any application that requires storing, querying or updating large volumes of data. The purpose of this course es to introduce the student to the design and use of database management systems, specifically relational databases and XML databases.
Prerequisite Courses:	IIC2233 Advanced computer programing
Co-requisite Courses:	No
Status in the Curriculum:	Required
Course Learning Outcomes:	<ol style="list-style-type: none">1. Understand what a database management system is, and know the advantages and disadvantages of the relational and XML models.2. Design relational databases for applications based in real life scenarios.3. Use the SQL query language for relational databases.4. Understand fundamental concepts of database theory, especially relational algebra, and understand how to use this theory to study the limitations of database systems.5. Know basic notions of the XML model6. Understand the most important challenges faced by the database industry. Discuss and know how to elaborate design and implementation solutions for database systems.

Relation of Course to
ABET Criteria:

- a. Knowledge of mathematics, science and engineering
- c. Design a system, component, or process
- d. Multidisciplinary teams
- e. Identify, formulate, and solve engineering problems
- f. Professional and ethical responsibility
- g. Effective communication
- h. Broad education necessary for global, economic, environmental and societal context
- i. Recognition of the need for, and an ability to engage in life-long learning
- j. Knowledge of contemporary issues
- k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

1. Database systems
 - a. Importance of databases
 - b. Database systems against ad-hoc storage.
 - c. Data models: XML, relational.
 - d. Evolution of database systems.
 - e. Basic architecture of database systems.
2. Introduction to the relational model: basic concepts, basic SQL.
3. Modelling (design)
 - a. Creation of tables
 - b. Modelling languages; E/R diagrams
 - c. Principles of design.
 - d. From E/R diagrams to relational schemas.
 - e. Modelling of constraints, normal forms.
4. Advanced SQL
 - a. Outerjoins and null values.
 - b. Views.
 - c. Data integration problem.
 - d. Sorted procedures and cursors.
 - e. Transactions and concurrency control.
 - f. Management tools.
5. Theoretical concepts: Relational algebra, limitations of SQL (nulls, transitive closure, etc.)
6. Indexing and optimization
 - a. Processing of relational operators.
 - b. Optimization of relational queries.
 - c. Indexes.
7. Other data models
 - a. XML.
 - b. Languages XPath and XQuery.
 - c. Semistructured models, object oriented databases.