

MODULE SPECIFICATION • ELECTIVE

SQL-NoSQL

The purpose of this course is to provide an introduction to SQL and NoSQL databases. The course clarifies differences between SQL and NoSQL databases and covers the principles of database design and management, including data modelling, normalisation and indexing. Further, it introduces popular SQL and NoSQL databases, such as MySQL, PostgreSQL and MongoDB.

10 CREDITS	15h CONTACT HOURS	85h PRIVATE STUDY	100h TOTAL STUDY
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COURSE CONVENOR

NAME	Woody Pan
OFFICE	By appointment — please email to arrange a convenient time

COURSE STRUCTURE

Econ 623 is a 10-credit course and students are expected to input approximately 100 hours of study. The total number of contact hours is 15 hours, leaving 85 hours for private study. Delivery is by lectures — 15 hours across the first three weeks of term, comprising 10 hours of lectures and 5 hours of tutorials. Optional clinics run on the last day of the course.	During private study, balance the course material (the primary source) against the recommended textbooks: think critically about how these fit into the body of knowledge, perform the exercises, complete coursework and revise. You can expect to perform well only by working consistently through the year.
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MODULE PROGRAMME

LECT.	TOPIC	SESSION CONTENT
02	Basic Concepts	- Relations and tuples - Keys, dependencies and normalization - Two examples of normalized schemas
03	Algebraic Language	- Algebra operators - Join - Algebraic expressions
04	SQL, Summary	- Designing an SQL query - Select-From-Where block - Queries and sub-queries - Aggregates, updates, views
05	Database Design	- Normalization - Entity-Relationship model - Advanced concepts - From E/R schema to relational schema
06	NoSQL and Non-Relational Databases	- The basics of NoSQL and non-relational databases - The differences between SQL and NoSQL databases - Querying data in NoSQL databases - Introduction to popular NoSQL databases, such as MongoDB and Cassandra

KEY SKILLS

By the end of this course, students should have some knowledge and understanding of:

- SQL proficiency.** Ability to query and manipulate data using SQL.
- NoSQL competence.** Proficiency in utilising NoSQL for data manipulation.
- Data querying skills.** Skills to effectively retrieve and manipulate data in data science projects.
- Confident SQL and NoSQL use.** Confidence and experience in using both SQL and NoSQL.
- Database management.** Managing databases efficiently for data science applications.
- Practical experience.** Hands-on experience in applying SQL and NoSQL to real-world projects.
- Data manipulation expertise.** Expertise in manipulating and organising data using SQL and NoSQL.
- Data science application.** Applying SQL and NoSQL skills to enhance data science projects.

DESIRED OUTCOMES

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

- Understand the basics of database design and management
- Design and implement SQL and NoSQL databases that are efficient, scalable and maintainable
- Use common SQL and NoSQL databases, such as MySQL, PostgreSQL and MongoDB
- Query and manipulate data in SQL and NoSQL databases
- Communicate effectively about database concepts and techniques



ASSESSMENT

WEIGHTING	100% coursework
ISSUED	End of week 6
DUE	End of week 10 — four weeks for completion
SUBMISSION	Electronically via the Moodle site for this course
FEEDBACK	Returned within 4 weeks of the deadline, as marker's notes appended to the PDF of your coursework

Marking criteria and penalties are set out in the Economics Undergraduate Handbook and the general course information paper, available via the Current Student page of the university website under Academic Regulations.

COURSE TEXT & RECOMMENDED READING

Book chapters and online material. Copies of the lecture slides are made available on the course web pages, together with additional material and course announcements.

- Meier, A. and Kaufmann, M. (2019). SQL & NoSQL Databases: Models, Languages, Consistency Options and Architectures for Big Data Management. Springer