

Econ623 : SQL-NoSQL

COURSE AIMS & OBJECTIVES, KEY SKILLS AND LEARNING OUTCOMES

Course Aims & Objectives: This course provides 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.

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.

COURSE STRUCTURE

Econ 623 is a 10 credits course and therefore students are expected to input approximately 100 hours of study into the course. The total number of contact hours on Econ 623 is 15 hours. This leaves 85 hours for private study. Course Delivery comes in the form of Lectures with 15 hours delivered over the first 3 weeks of the term (10 hours of lectures and 5 hours of tutorials). There will be optional clinics on the last day of the course.

During your private study you should strike a balance between reading the course material (which is the primary source of information) and the recommended textbooks, thinking critically about how these fit in to the body of knowledge on the subject and about how our level of knowledge can be improved, performing exercises, completing coursework and revising for examinations. You can expect to perform well on this course only if you work consistently through the year.

COURSE CONVENOR

Woody Pan

LECTURERS CONTACT INFORMATION (Including Office Hours)

Woody Pan

email: woody@foxintelligence.io

Thomas Pical

email: tpical@equancy.com

COURSEWORK ASSESSMENT

The CWA mark will be calculated as 100% coursework. The coursework will be assigned at the end of the course

The coursework will be delivered to students at the end of week 6 of each term and is due for submission at the end of week 10 of the term, allowing students 4 weeks for completion.

Coursework must be submitted electronically through the Moodle site for this course:

FEEDBACK ON COURSEWORK:

The coursework will be marked and returned to students within 4 weeks of the submission deadline. Feedback will consist of marker's notes appended to the pdf of your coursework.

MARKING CRITERIA AND PENALTIES

Marking criteria can be found in the Economics Undergraduate Handbook and the general course information paper. An electronic copy of this can be found via the Current Student page of the

university website then follow the Academic Regulations link
<https://gap.lancs.ac.uk/ASQ/QAE/MARP/Documents/UG-Assess-Regs.pdf>

FINAL MARK INFORMATION

This course is assessed 100% by means of coursework. The final mark is the average of the marks obtained in the two pieces of coursework.

COURSE TEXT AND RECOMMENDED READING

Lecture notes and Lecture slides.

SQL & NoSQL Databases: Models, Languages, Consistency Options and Architectures for Big Data Management

Andreas Meier · Michael Kaufmann

Jul 2019 · Springer

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COURSE OUTLINE/LECTURE SCHEDULE

Introduction

- Overview of the Course Content and Structure
- Learning with this Course

Basic Concepts

- Relations and Tuples
- Keys, Dependencies, and Normalization
- Two Examples of Normalized Schemas

Algebraic Language

- Algebra Operators
- Join
- Algebraic Expressions

SQL, Summary

- Designing an SQL Query
- Select-From-Where Block
- Queries and Sub-Queries
- Aggregates, Updates, Views

Database Design

- Normalization
- Entity-Relationship Model
- Advanced Concepts
- From E/R Schema to Relational Schema

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