



<b>Syllabus</b>
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**SCHOOL OF TECHNOLOGY & COMPUTING**  
CS214 Database Technologies

5 Credits  
Effective Date: Summer 2020

*Access to the Internet is required.  
All written assignments must be in Microsoft-Word-compatible formats.  
See the library's APA Style Guide tutorial for a list of resources that can help you use APA style.*

## **FACULTY**

Faculty Name: FACULTY NAME

Contact Information: CONTACT INFORMATION

[INSTRUCTOR MAY INSERT PERSONAL MESSAGE IF DESIRED]

## **COURSE DESCRIPTION**

This course covers data modeling, design, normalization, change control, backup/recovery, data dictionaries, client-server architecture, and SQL / NoSQL Databases. The emphasis is on understanding why information resources are of critical importance and how to manage them. The course concludes with a discussion of the future directions of database technologies.

## **COURSE RESOURCES**

Darmawikarta, D. (2014). [SQL for MySQL: A Beginner's Tutorial](#). Brainy Software Corp. (ISBN 9780980839678)

Fowler, A. (2015). [NoSQL for Dummies](#). John Wiley & Sons, Inc. (ISBN 9781118905746)

## **COURSE OUTCOMES**

In this course, learners:

- Understand how the growth of the Internet and demands for information have changed data handling and transactional and analytical processing, and lead to the creation of SQL and NoSQL databases.
- Apply SQL and NoSQL data models to given scenarios including appropriate organization rules.
- Analyze how data fragmentation, replication, and allocation affect SQL and NoSQL database performance in an enterprise environment.
- Evaluate major database administration tasks such as create and manage database users, roles and privileges, backup, and restore database objects to ensure organizational efficiency, continuity, and information security.
- Create working SQL and NoSQL statements for simple and intermediate queries to create and modify data and database objects to store, manipulate, and analyze enterprise data.

## **CORE CONCEPTS**

Topics include:

- Using SQL Database and Basic Queries
  - Default Database
  - Creating a Table.
  - Adding data to the database
  - Updating data from the database
  - Deleting data to the database
  - The SELECT statement.
- Searching and Storing Queries
  - MATCH function
  - Boolean Searches using + and - operators
  - Column Aliases

- Expressions
- LIMIT, ORDER BY, GROUP BY, and HAVING clauses
- The DISTINCT keyword
- Aggregate Functions
- CASE Expression
- Storing a query output to a new table.
- Joining Tables and Subqueries
  - Primary Keys
  - Foreign Keys
  - Multiple tables using the JOIN clause
  - Table Aliases using the JOIN clause
  - OUTER JOIN, INNER JOIN, LEFT JOIN, and RIGHT JOIN
  - Self-Joins and Natural Joins
  - Single-Row, Multiple-Row, Multiple Nested, and Correlated Subqueries
  - Compound Queries
- Creating Views and Using Functions
  - Views
  - Nested Views
  - Built-in Functions.
  - Numeric Functions
  - Character Functions
  - Datetime Functions
  - NULL-related Functions
  - Transactions statements
- Functions and Metadata
  - Stored Routines for row-by-row processing, if-then-else decision logic, exception handling, and user-defined functions.
  - Data Dictionary.
  - Schema database
  - Schemata Table
  - Tables Table
  - Columns Table
  - Routines Table.
- NoSQL Databases Overview
  - The features of NoSQL
  - The different data types of NoSQL
  - Business Intelligence
  - Batch processing with Hadoop Map/Reduce
- Document Databases Overview and Enterprise Use Case
  - The features of Document Databases
  - Key-Value Stores.
  - Sharing, Key-Based Sharing, and Automatic Sharding
  - Durability, Replication, and Consistency
- Indexing, Caching, and Open-Source Document Database
  - Different use cases of Document Databases
  - How to manage data structures
  - How to consolidated data and handle incoming streams
  - Different Document Database products
  - How to handle JSON documents with MongoDB

- How to implement effective indexing with MongoDB
- Key-Value Stores Structure and Data Types
  - The common features of Key-Value Stores
  - How to manage availability in Key-Value Stores
  - Trading consistency in Key-Value Stores
  - How to manage keys in Key-Value Stores
  - How to manage data in Key-Value Stores
  - How to scale in Key-Value Stores
  - In-memory caching in Key-Value Stores
- Evaluating Different Key-Value Stores
  - Different use cases of Key-Value Stores
  - How to manage user information in Key-Value Stores
  - How to handle user sessions in Key-Value Stores
  - High-speed data caching in Key-Value Stores
  - Different Key-Value Store products
  - How to handle partitioning in Key-Value Stores

## OVERVIEW OF COURSE GRADING

The grades earned for the course will be derived by using City University of Seattle’s decimal grading system, based on the following:

OVERVIEW OF REQUIRED ASSIGNMENTS	% OF FINAL GRADE	POINTS
The Muddiest Point (MP)	5%	50 = 5 points * 10 modules
Concept Test (CT)	5%	50 = 5 points * 10 modules
Discussion Board (DB)	10%	100 = 10 points * 10 modules
Hands-On Practice (HOP)	20%	200 = 20 points * 10 modules
Programming Exercise (PE)	30%	300 = 30 points * 10 modules
Knowledge Check (KC)	10%	100 = 10 points * 10 modules
Team Project (TP)	20%	Proposal: 30 points Progress: 70 points Final Report: 70 points Final PPT: 30 points Subtotal: 200 points
<b>TOTAL</b>	<b>100%</b>	<b>1,000 points</b>

The following approaches are used for developing this course content:

### Assessment

- Summative Assessment. [https://en.wikipedia.org/wiki/Summative\\_assessment](https://en.wikipedia.org/wiki/Summative_assessment)
- Formative Assessment. [https://en.wikipedia.org/wiki/Formative\\_assessment](https://en.wikipedia.org/wiki/Formative_assessment)

### Classroom Assessment Techniques

- The Muddiest Point. [https://en.wikipedia.org/wiki/Classroom\\_Assessment\\_Techniques](https://en.wikipedia.org/wiki/Classroom_Assessment_Techniques)

### Active Learning. [https://en.wikipedia.org/wiki/Active\\_learning](https://en.wikipedia.org/wiki/Active_learning)

- Flipped Classroom. [https://en.wikipedia.org/wiki/Flipped\\_classroom](https://en.wikipedia.org/wiki/Flipped_classroom)

- Just-in-time Teaching (JiTT). [https://en.wikipedia.org/wiki/Just-in-time\\_teaching](https://en.wikipedia.org/wiki/Just-in-time_teaching)
- Peer Instruction. [https://en.wikipedia.org/wiki/Peer\\_instruction](https://en.wikipedia.org/wiki/Peer_instruction))

Learning Theory

- Learning-by-doing. <https://en.wikipedia.org/wiki/Learning-by-doing>
- Project-Based Learning (PBL). [https://en.wikipedia.org/wiki/Project-based\\_learning](https://en.wikipedia.org/wiki/Project-based_learning)
- Social Learning. [https://en.wikipedia.org/wiki/Social\\_learning\\_\(social\\_pedagogy\)](https://en.wikipedia.org/wiki/Social_learning_(social_pedagogy))

Evidence-Based Practice (EBP). [https://en.wikipedia.org/wiki/Evidence-based\\_practice](https://en.wikipedia.org/wiki/Evidence-based_practice)

- Pair Programming. [https://en.wikipedia.org/wiki/Pair\\_programming](https://en.wikipedia.org/wiki/Pair_programming)
- Stand-up Meeting. [https://en.wikipedia.org/wiki/Stand-up\\_meeting](https://en.wikipedia.org/wiki/Stand-up_meeting)
- Agile Software Development. [https://en.wikipedia.org/wiki/Agile\\_software\\_development](https://en.wikipedia.org/wiki/Agile_software_development)

**SPECIFICS OF COURSE ASSIGNMENTS**

The instructor will provide grading rubrics that will provide more detail as to how this assignment will be graded.

**The Muddiest Point (MP)**

Before class, students are required to finish the muddiest point activity. This activity is designed to stimulate student engagement in class. Also, the instructor uses feedbacks from the Muddiest Point in preparation for the classroom lecture to implement Just-in-Time Teaching (JiTT). This activity consists of writing a brief reflective essay (<= 50 words) in which students identify the most confusing part (i.e., the muddiest point) of the content covered in the upcoming module. If you do not have an MP, you can explain the most exciting aspect. Also, students will answer one multiple choice question from the required reading to determine students’ grasp of core concepts.

<i>Components</i>	<i>% of Grade</i>
Quality Participation: Meets requirements on time.	60%
Writing: Is clear, concise, and grammatically correct.	20%
Accuracy: Answers quizzes correctly.	20%
<b>TOTAL</b>	<b>100%</b>

**Concept Test (CT)**

In class, students may be required to answer questions called Concept Tests, which allows peers to teach others, i.e., Peer Instruction. 1) The instructor poses a problem based on students' responses to their pre-class reading. 2) Students reflect on the question. 3) Students commit to a definite answer. 4) Instructor reviews student responses without giving the correct answer to the students. 5) Students discuss their thinking and solutions with their peers. 6) Students then commit again to a specific answer. 7) The instructor back reviews responses and decides whether more explanation is needed before moving on to the next concept. Any participating students will earn their 100% grade.

<i>Components</i>	<i>% of Grade</i>
Quality Participation: Meets requirements on time.	100%
<b>TOTAL</b>	<b>100%</b>

**Discussion Board (DB)**

All classes are required to use the Discussion Board. Participation through DB is an integral part of this course. It is defined as active engagement in a discussion or other activity. Instructors will determine the

type of activities and their due dates; moreover, different DB activities will have different substance and length guidelines. The instructor will provide specific instructions to students.

A discussion question or topic from the instructor appears weekly in the Discussion Board. Students post their answers and responses to two other students' ones in the DB by the end of each module. The DB is to help promote student to student engagement. The instructor may not respond to each posting. Questions or comments specifically for the instructor should be emailed directly to the instructor or posted in the Question and Answer Forum. Students who want to talk with other students about issues unrelated to the discussion forums should use the Coffee Talk Forum.

Although the tone of your DB postings can be informal, your instructor will expect the content to be on a professional level. Your comments and questions for discussion should be clear and thoughtful, with correct grammar, spelling, and punctuation. As with written assignments, the quality of your discussion postings will be graded on both content and presentation.

<i>Components</i>	<i>% of Grade</i>
Quality Participation: Meets requirements on time.	80%
Writing: Is clear, concise, and grammatically correct.	20%
<b>TOTAL</b>	<b>100%</b>

### **Hands-on Practice (HOP)**

The instructor may assign hands-on practice exercises to a pair of students in class or individually online. Students will learn and practice either specific tools or languages pertinent to their course. Each activity will be graded by pass or fail to encourage collaboration among students. (Pair programming can be used for the generation of more diverse solutions to problems.)

- HOP01: Create and connect to a Microsoft SQL Database Locally.docx
- HOP01A: Windows OS - Create and connect to a Microsoft SQL database with Amazon RDS
- HOP01B: Basic Queries.doc
- HOP02: Query Output and Grouping
- HOP03: Joins and Subqueries
- HOP04: Views and Functions
- HOP05: Stored Procedures
- HOP06A: Installing MongoDB and Creating a Database.
- HOP06B Deleting a Database a Creating a Collection on MongoDB
- HOP07A Inserting Documents in a Collection
- HOP07B Query a Document based on Criteria
- HOP08 MapReduce
- HOP09 AWS DynamoDB
- HOP10 Scanning and Querying with DynamoDB

<i>Components</i>	<i>% of Grade</i>
Quality Participation: Meets requirements on time.	80%
Accuracy: Answers questions correctly.	20%
<b>TOTAL</b>	<b>100%</b>

### **Programming Exercise (PE)**

The students must individually perform the programming exercise, which is based on the topics and Hands-on Practice. No code sharing or copying from other sources are allowed. Non-executable programs will not be graded. The programs in poor coding styles will be asked to be resubmitted. **Please note that copying a segment of code from the Internet and submitting it as your work is considered as plagiarism.**

<i>Components</i>	<i>% of Grade</i>
Accuracy: Answers questions correctly.	80%
Writing: Is clear, concise, and grammatically correct.	20%
<b>TOTAL</b>	<b>100%</b>

### **Knowledge Check (KC)**

Students will complete weekly quizzes from the course content to reflect on what they have learned in the course. Completing all KCs will help ensure that you successfully master the concepts in this course. The best way for you to gain a thorough understanding of the underlying concepts is to apply those concepts to solve the quizzes. You should focus on the underlying principles, rather than just memorizing information.

<i>Components</i>	<i>% of Grade</i>
Accuracy: Answers questions correctly.	100%
<b>TOTAL</b>	<b>100%</b>

### **Team Project (TP)**

Each student can select his or her team that consists of three students. A group of fewer than three students requires the instructor’s approval. Each team will use an instructor-approved topic relevant to the course.

The paper must be no less than 6-7 pages. We required you to use the paper template from [EDSIG/CONISAR](#), the international conference standard. *The instructor may recommend the best papers in this course to conferences with your team’s approval. If necessary, the instructor may require more revisions after the course is over. However, the paper submission is optional and has nothing to do with your course grade.*

We will provide you three report templates and one presentation template. The file name consists of team project number, team number, and the list of your team members. For example, “TP01 T03 Sam John Mark.”

- TP01 for the proposal - “TP01 TOX Author1 Author2 Author3.docx”
- TP02 for the progress report - “TP02 TOX Author1 Author2 Author3.docx”
- TP03 for the final report - “TP03 TOX Author1 Author2 Author3.docx”
- TP04 for the final presentation slide - “TP04 TOX Author1 Author2 Author3.pptx”

As in any scholarly writing, students should not merely copy information from another author. Students should use evidence to support the contentions they have drawn from their findings and critically analyze related literature. In essence, each paper needs to be an analytical paper, not a summary of readings.

In addition, a team presentation slide is required.

- The presentation consists of 15+4 slides: 15 slides for content and 4 slides for cover, agenda, key reference, and Q&A.
- The PPT template is provided. Your team can change design and color for your team’s purpose.
- If necessary, a presentation video (15 minutes) may be requested.

- If necessary, a demo video (a maximum of 1-2 minutes) may be requested. But, the demo time should be included the total presentation time (15 minutes).

The following two resources are useful to improve your report:

- Plagiarism Checker - [Plagiarism Detector](https://plagiarismdetector.net/) (free) at <https://plagiarismdetector.net/>
- Grammar Checker - [Grammarly.com](https://app.grammarly.com/) (partially free) at <https://app.grammarly.com/>

The following two resources are useful to improve your presentation slides:

- St. George International School of English. (2013, Nov 14). [Steve Jobs Presentation Skills](https://www.youtube.com/watch?v=iJq-thyDF9Q) (7:34). Retrieved from <https://www.youtube.com/watch?v=iJq-thyDF9Q>
- Gyaantastic. (2017, Feb 5). [7 Presentation Skills to learn from Steve Jobs](https://medium.com/@gyaantastic/7-presentation-skills-to-learn-from-steve-jobs-8fbfdebc4fc4). Retrieved from <https://medium.com/@gyaantastic/7-presentation-skills-to-learn-from-steve-jobs-8fbfdebc4fc4>

**Four** submissions are required according to the following schedule:

- Proposal (1 page; 30 points) - Starting (Module 1) & Ending (Module 3)
- Progress Report (3-4 pages; 70 points; graded after the proposal has been submitted) - Starting (Module 4) & Ending (Module 7)
- Final Report (6-7 pages; 70 points; graded after the progress has been submitted) - Starting (Module 8) & Ending (Module 10)
- Final PPT (15+4slides, 30 points; graded after the final report has been submitted) - Starting (Module 8) & Ending (Module 10)

Students are expected to use the assigned readings, videos, and other materials throughout the quarter. Students will need to utilize additional sources that were not assigned by the professor. While stylized after an industry report, nonetheless, students are expected to employ APA formatting of citations, footnotes, and bibliography. Students must cite the sources of all ideas, facts, and information used that are not their own, even if they have put the information into their own words. Failure to do so is plagiarism, although the oversight is unintentional. To avoid plagiarism, check <https://library.cityu.edu/howto/apa-writing/avoid-plagiarism/>.

### **Project Description: SQL and NoSQL Database System Development**

Students are required to develop a database and query statements by using one SQL and two NoSQL DBMSs. Each team needs to select a database design case with the instructor's approval.

<i>Components</i>	<i>% of Grade</i>
Structure: Consists of the required report elements.	10%
Content: Demonstrates critical analysis & synthesis of concepts.	30%
Reference: Is pertinent to the topic and cited appropriately.	10%
Writing: Is clear, concise, and grammatically correct.	10%
Visual Presentation: Is well designed, legible, and persuasive.	20%
Team Collaboration: Is based on peer review.	20%
<b>TOTAL</b>	<b>100%</b>

## **COURSE POLICIES**

### **Late Assignments**

The late assignment without advanced notice will receive an -10% penalty per day for a maximum of 7 days.



## **Participation**

Students will participate in activities and discussions as defined by the instructor. Whether in class, online, or a mixed-mode setting, students will be graded on the following things: their participation in classroom discussions; their ability to present, explain, or defend alternative viewpoints; and the degree to which they have mastered the concepts and principles inherent in the study of the subjects.

## **Professional Writing**

Assignments require error-free writing that uses Standard English conventions and logical flow of organization to address topics thoroughly and concisely. CityU requires the use of APA style.

## **UNIVERSITY POLICIES**

You are responsible for understanding and adhering to all of City University of Seattle's academic policies. The most current versions of these policies can be found in the [University Catalog](#) linked to the CityU Website.

### **Scholastic Honesty**

Academic honesty in students requires the pursuit of scholarly activity that is free from fraud, deception, and unauthorized collaboration with other individuals. You are responsible for understanding CityU's policy on academic honesty and adhering to its standards in meeting all course requirements. A complete copy of this policy can be found in the [University Catalog](#) in the section titled *Scholastic Honesty* under *Student Rights & Responsibilities*.

### **Attendance**

Students taking courses in any format at the University are expected to be diligent in their studies and to attend class regularly.

Regular class attendance is essential in achieving learning outcomes in the course and maybe a valid consideration in determining the final grade. For classes where a physical presence is required, a student has attended if s/he is present at any time during the class session. For online courses, a student has attended if s/he has posted or submitted an assignment. A complete copy of this policy can be found in the [University Catalog](#) in the section titled *Attendance Policy for Mixed Mode, Online and Correspondence Courses*.

## **SUPPORT SERVICES**

### **Disability Resources**

If you are a student with a disability and require an accommodation, please contact the Disability Resource Office as soon as possible. For additional information, please see the section in the [University Catalog](#) titled *Students with Special Needs* under *Student Rights & Responsibilities*.

### **Library Services**

CityU librarians help you find the resources and information you need to succeed in this course. Contact a CityU librarian through the [Ask a Librarian](#) service, or access [library resources and services online](#), 24 hours a day, seven days a week.

### **Smarthinking**

As a CityU student, you have access to 10 free hours of online tutoring offered through Smarthinking, including writing support from certified tutors 24 hours a day, seven days a week. Contact CityU's Student Support Center at [help@cityu.edu](mailto:help@cityu.edu) to request your user name and password.