Course Outline

School:	Eng. Tech. & Applied Science
Department:	Information and Communication Engineering Technology (ICET)
Course Title:	Advanced Database Concepts
Course Code:	COMP 214
Course Hours/Credits:	56
Prerequisites:	COMP 122
Co-requisites:	N/A
Eligible for Prior Learning, Assessment and Recognition:	Yes
Originated by:	John Bailey
Creation Date:	Fall 2008
Revised by:	Ilia Nika, Bim Harlal, Patrick Gignac,Yin Hua Li
Revision Date:	Winter 2025
Current Semester:	Summer 2025
Approved by:	

Clarence Cheung, Associate Dean/Dean
Eng. Tech. & Applied Science

Students are expected to review and understand all areas of the course outline.Retain this course outline for future transfer credit applications. A fee may be charged for additional copies.This course outline is available in alternative formats upon request.

Acknowledgement of Traditional Lands

Centennial is proud to be a part of a rich history of education in this province and in this city. We acknowledge that we are on the treaty lands and territory of the Mississaugas of the Credit First Nation and pay tribute to their legacy and the legacy of all First Peoples of Canada, as we strengthen ties with the communities we serve and build the future through learning and through our graduates. Today the traditional meeting place of Toronto is still home to many Indigenous People from across Turtle Island and we are grateful to have the opportunity to work in the communities that have grown in the treaty lands of the Mississaugas. We acknowledge that we are all treaty people and accept our responsibility to honor all our relations.

Course Description

This course is intended to expand the student's knowledge of business databases using RDBMS and NoSql. The course introduces students to the steps required to install and configure a database server and development system. Then, it expands on the students' knowledge of SQL by introducing more complex syntax than that covered in the first database course. Topics covered include SQL advanced queries, advanced data and table manipulation commands, basic security, triggers, functions, procedures, packages, MongoDB CRUD operations and Aggregation Framework. The course will include a project to develop the database back-end for a "commercial" web application.

External Standard Information (ESI)

N/A

Program Outcomes

Successful completion of this and other courses in the program culminates in the achievement of the Vocational Learning Outcomes (program outcomes) set by the Ministry of Colleges and Universities in the Program Standard. The VLOs express the learning a student must reliably demonstrate before graduation. To ensure a meaningful learning experience and to better understand how this course and program prepare graduates for success, students are encouraged to review the Program Standard by visiting http://www.tcu.gov.on.ca/pepg/audiences/colleges/progstan/. For apprenticeship-based programs, visit https://www.skilledtradesontario.ca/about-trades/trades-information/.

Course Learning Outcomes

The student will reliably demonstrate the ability to:

1. Install database software and developer system.
2. Write SQL and NoSql commands to
   a. Perform inner, outer, left or right joins
   b. Perform joins using relational set operators
   c. Query and manipulate data in NoSQL database
   d. Aggregate data

3. Write SQL commands to perform advanced data and table manipulation in the context of a prescribed business problem.
4. Explain the basic concepts of security and the responsibilities of a database administrator.
5. Write PL/SQL anonymous blocks, procedures, functions, triggers and packages to access and manipulate data.
6. Create the back-end to a software application using functions, procedures, packages and triggers.

Essential Employability Skills (EES)

The student will reliably demonstrate the ability to*:

1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.
3. Execute mathematical operations accurately.
4. Apply a systematic approach to solve problems.
5. Use a variety of thinking skills to anticipate and solve problems.
6. Locate, select, organize, and document information using appropriate technology and information systems.
7. Analyze, evaluate, and apply relevant information from a variety of sources.
8. Show respect for diverse opinions, values belief systems, and contributions of others.
9. Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.
10. Manage the use of time and other resources to complete projects.
11. Take responsibility for one's own actions, decisions, and consequences.

**There are 11 Essential Employability Skills outcomes as per the Ministry Program Standard. Of these 11 outcomes, the following will be assessed in this course.*

New Essential Skills (NES)

1. N/A

Global Citizenship and Equity (GC&E) Outcomes

1. N/A

Methods of Instruction

Interactive lectureDemonstrationLab sessionCase Study

Text and Other Instructional/Learning Materials

The costs of textbooks or other learning material are available through the Centennial College Bookstore https://www.bkstr.com/centennialprogressstore/shop/textbooks-and-course-materials.

Text Book(s):

Casteel, Joan. 2013. Oracle 11g: PL/SQL Programming, 2nd Edition. Cengage Learning.ISBN-13:

9781133947363Recommended:Casteel, Joan. 2016. Oracle 12c:SQL. Cengage Learning.ISBN-13: 9781305251038Paul Done, Practical MongoDB Aggregation, available at https://www.practical-mongodbaggregations.com/ **Online Resource(s):**

www.oracle.comwww.mongodb.com

Please see the weekly topical outline for any Additional Learning Resources required for your section of this course.

Evaluation Scheme

- Quizzes: Weekly quizzes
- Assignment 1: Nested queries and sub-queries
- Assignment 2: Basic PL/SQL
- Assignment 3: Implementation of stored procedures and functions
- Midterm test: Hands-on test
- Group project: Database programming to support a simple business application
- Assignment 4: MongoDB CRUD and Aggregation Framework
- Final test: Hands-on test

Evaluation Name	CLO(s)	EES Outcome(s)	NES Outcome(s)	GCE Outcome(s)	Weight/ 100
Quizzes	1, 2, 3, 5	1, 2, 3, 4, 5, 7, 11			15
Assignment 1	2, 3	1, 2, 3, 4, 5, 7, 11			10
Assignment 2	2, 3, 4	1, 2, 3, 4, 5, 7, 11			10
Assignment 3	5	5			10
Midterm test	2, 3, 5	1, 2, 3, 4, 5, 7, 11			15
Group project	2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11			15
Assignment 4	2	1, 2, 3, 4, 5, 7, 11			10
Final test	2, 3, 5	1, 2, 3, 4, 5, 7, 11			15
Total					100%

If students are unable to write a test they should immediately contact their professor or program Associate Dean for advice. In exceptional and well documented circumstances (e.g. unforeseen family problems, serious illness, or death of a close family member), students may be able to write a make-up test.All submitted work may be reviewed for authenticity and originality utilizing College approved plagiarism prevention software. Students who do not wish to have their work submitted to College approved plagiarism prevention software must, by the end of the second week of class, communicate this in writing to the instructor and make mutually agreeable alternate arrangements.When writing tests, students must be able to produce official Centennial College photo identification or they may be refused the right to take the test or test results will be void.Tests or assignments conducted remotely may require the use of online proctoring technology where the student’s identification is verified and their activity is monitored and/or recorded, both audibly and visually through remote access to the student's computer and web camera. Students must communicate in writing to the instructor as soon as possible and prior to the test or assignment due date if they require an alternate assessment format to explore mutually agreeable alternatives.

Student Accommodation

The Centre for Accessible Learning and Counselling Services (CALCS) (http://centennialcollege.ca/calcs) provides programs and services which empower students in meeting their wellness goals, accommodation and disability-related needs. Our team of professional psychotherapists, social workers, educators, and staff offer brief, solution-focused psychotherapy, accommodation planning, health and wellness education, group counselling, psycho-educational workshops, adaptive technology, and peer support. Walk in for your first intake session at one of our service locations (Ashtonbee Room L1-04, Morningside Room 190, Progress Room C1-03, The Story Arts Centre Room 285, Downsview Room 105) or contact us at calcs@centennialcollege.ca, 416-289-5000 ext. 3850 to learn more about accessing CALCS services.

Use of Dictionaries

Program or School Policies

N/A

Course Policies

N/A

College Policies

Students should familiarize themselves with all College Policies that cover academic matters and student conduct.All students and employees have the right to study and work in an environment that is free from discrimination and harassment and promotes respect and equity. Centennial policies ensure all incidents of harassment, discrimination, bullying and violence will be addressed and responded to accordingly.Academic HonestyAcademic honesty is integral to the learning process and a necessary ingredient of academic integrity. Forms of academic dishonesty include cheating, plagiarism, and impersonation, among others. Breaches of academic honesty may result in a failing grade on the assignment or course, suspension, or expulsion from the college. Students are bound to the College's AC100-11 Academic Honesty and Plagiarism policy. To learn more, please visit the Libraries information page about Academic Integrity https://libraryguides.centennialcollege.ca/academicintegrity and review Centennial College's Academic Honesty Module: https://myappform.centennialcollege.ca/ecentennial/articulate/Centennial_College_Academic_Integrity_Module_%202/story.htmlUse of Lecture/Course MaterialsMaterials used in Centennial College courses are subject to Intellectual Property and Copyright protection, and as such cannot be used and posted for public dissemination without prior permission from the original creator or copyright holder (e.g., student/professor/the College/or third-party source). This includes class/lecture recordings, course materials, and third-party copyright-protected materials (such as images, book chapters and articles). Copyright protections are automatic once an original work is created, and applies whether or not a copyright statement appears on the material. Students and employees are bound by College policies, including AC100-22 Intellectual Property, and SL100-02 Student Code of Conduct, and any student or employee found to be using or posting course materials or recordings for public dissemination without permission and/or inappropriately is in breach of these policies and may be sanctioned.For more information on these and other policies, please visit www.centennialcollege.ca/about-centennial/collegeoverview/college-policies.Students enrolled in a joint or collaborative program are subject to the partner institution's academic policies.

PLAR Process

This course is eligible for Prior Learning Assessment and Recognition (PLAR). PLAR is a process by which course credit may be granted for past learning acquired through work or other life experiences. The PLAR process involves completing an assessment (portfolio, test, assignment, etc.) that reliably demonstrates achievement of the course learning outcomes. Contact the academic school to obtain information on the PLAR process and the required assessment.

Topical Outline (subject to change):

ORIGINAL TOPICAL

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and	Evaluation Date
1	Review SQL DML & DDL Connect to Database server	Lecture Handout	. Install Oracle SQL Developer . Describe Oracle 12C architecture . Utilize SQL DML & DDL commands to perform basic CRUD	Interactive lecture Demonstration Lab session		
2	Sequences Indexes Synonyms Views	Chapter 6 & Chapter 13 (Oracle 12C: SQL)	. Create and use sequences . Create/manage indexes and synonyms . Create/manage views	Interactive lecture Demonstration Lab session	Assignment 1	Week 3
3	Subqueries Merge	Chapter 12 (Oracle 12c: SQL)	. Write SQL queries to group data . Write queries with subqueries, EXISTS, inner and outer joins . Write queries using UNION, INTERSECT, and MINUS.	Interactive lecture Demonstration Lab session	Quiz 1	
4	Basic PL/SQL Block Structures	Chapter 1 and 2	. Employ basic PL/SQL structures such as conditional statements, loops, etc. in program	Interactive lecture Demonstration Lab session	Quiz 2 Assignment 2	Week 5
5	Handling data in PL/SQL blocks	Chapter 3	. Include a query in PL/SQL block . Implement PL/SQL control structure . Use record variables . Handle data using collections	Interactive lecture Demonstration Lab session Case study	Quiz 3	

6	Cursors and Exception handling	Chapter 4	. Describe implicit and explicit cursors . Employ cursors in PL/SQL programs . Describe exception handlers . Implement exception handling in PL/SQL programs .	Interactive lecture Demonstration Lab session Case study	Quiz 3 Assignment 3	Week 7
7	Procedures & Functions	Chapter 5 and 6	. Describe the component of a procedure/function . Compare procedures and functions . Implement business logic and rules in PL/SQL procedures and/or functions	Interactive lecture Demonstration Lab session Case study	Quiz 5 Quiz 6	
8	PL/SQL Packages	Chapter 7	. Describe packages . Create and consume packages	Interactive lecture Demonstration	Mid-term Hands-on	Week 11

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and	Evaluation Date
			. Grant execution privileges for program unit and packages	Lab session Case study	Exam Group Project	
9	Dependency, Privileges and Compilation	Chapter 8	. Identify direct and indirect dependencies . Grant program unit privileges . Construct compiler parameters and conditions, etc.	Interactive lecture Demonstration Lab session	Quiz 7	
10	Triggers	Chapter 9	. Describe database triggers . Distinguish different triggers, such as DML triggers, Instead of triggers, etc. . Describe the trigger-firing order . Create and test triggers . Delete triggers .	Interactive lecture Demonstration Lab session Case study	Quiz 8	

11	NoSQL Introduction & MongoDB CRUD operations	Lecture Handout	. Describe NoSQL database . Distinguish different types of NoSQL databases . MongoDB Overview . Perform CRUD operations using Mongosh .	Interactive lecture Demonstration Lab session	Quiz 9	
12	MongoDB Aggregation Framework (I)	Lecture Handout	. Describe MongoDB aggregation framework . Perform aggregation using single-purpose aggregation methods . Explain Aggregation Pipeline stages . Explain Aggregation pipeline expression operators, such as boolean operators, comparison operators, set expression & array operators, date operators, aggregation accumulators, etc. . Define aggregation pipelines	Interactive lecture Demonstration Lab session	Assignment 4	Week 13
13	MongoDB Aggregation Framework (II)	Lecture Handout	. Include $Lookup stage in Aggregation Pipeline . Define Aggregation Pipeline to perform trend analysis . Define Aggregation Pipeline to aggregate time-series data . Define Aggregation Pipeline to manipulate array	Interactive lecture Demonstration Lab session Case Study	Quiz 10	
14	Final Test	Week 7-13 materials	Week 7-13 learning outcomes	Hands-on test	Final Test	