CSD-4203 Database Programming

Computer Studies

Course Number:	**Co-Requisites:**	**Pre-Requisites:**
CSD-4203	N/A	N/A
Prepared by:	Jim Cooper, Professor	
Approved by:	Chris Slade, Dean of Information Technology	
Approval Date:	Monday, January 3, 2022	
Approved for Academic Year:	2021-2022	
Credit Weight:	3.00	

Course Description

Students explore SQL and PL/SQL database programming as it relates to the Oracle database environment. Students (1) create PL/SQL blocks that include program control structures, embedded SQL, cursors, and exception handling; (2) create stored procedures and functions; (3) create packages; and (3) implement database triggers. Oracle Application Express (APEX) is used for PL/SQL development. Concepts relating to the Oracle PL/SQL certification exam have been incorporated into this course for those students wishing to pursue certification.

Course Learning Outcomes/Course Objectives

1. **Create PL/SQL blocks that include program control structures, embedded SQL, cursors, and exception handling**
   - 1.1 Create and execute anonymous blocks
   - 1.2 Declare and initialize variables
   - 1.3 Insert comments into PL/SQL code
   - 1.4 Generate output messages using DBMS_OUTPUT
   - 1.5 Use bind variables
   - 1.6 Use SQL statements in PL/SQL
   - 1.7 Use an INTO clause to hold data retrieved in PL/SQL by a single-row SQL SELECT statement
   - 1.8 Use the %TYPE and %ROWTYPE attributes
   - 1.9 Construct PL/SQL statements that manipulate a database with DML statements (INSERT, UPDATE, and DELETE)
   - 1.10 Use implicit cursors

1.11 Employ the %NOTFOUND and %ROWCOUNT attributes

1.12 Use IF and IF-THEN-ELSE statements

1.13 Use CASE statements

1.14 Use iterative control with loop statements (basic loop, WHILE, and FOR)

1.15 Employ varies versions of explicit cursors

1.16 Declare and use a cursor with a parameter

1.17 Lock rows before an update operation

1.18 Apply NOWAIT in an update cursor declaration

1.19 Use the current row of the cursor in an UPDATE or DELETE statement

1.20 Use multiple cursors to produce multi-level reports

1.21 Declare and manipulate multiple cursors using parameters

1.22 Handle exceptions

1.23 Trap predefined and non-predefined exceptions

1.24 Identify an exception by error code and error message

1.25 Employ user-defined exceptions

1.26 Raise an exception

1.27 Use RAISE_APPLICATION_ERROR keyword

1.28 Handle propagating exceptions

2. Create stored procedures and functions

2.1 Create and invoke a stored procedure

2.2 Use parameters in procedures

2.3 Create a nested subprogram in the declarative section of a procedure

2.4 Create and invoke a function

2.5 Use parameters with functions

2.6 Employ functions in SQL statements

2.7 Implement propagated exception handling with procedures and functions

2.8 Remove a function and a procedure

3. Create packages

3.1 Create and compile the package specification and package body for a package

3.2 Invoke a package

3.3 Drop a package

3.4 Use %ROWTYPE as a parameter

3.5 Use user-defined record type as a parameter

3.6 Use public and global components

3.7 Use private and local components

3.8 Implement proper visibility of package components

3.9 Use forward declarations

3.10 Implement varies ways to overload a subprogram

3.11 Implement a bodiless package

3.12 Implement a package initialization block

4. Implement database triggers

4.1 Implement types of triggers based on level, timing, and event

4.2 Implement statement and row triggers

4.3 Create a row-level trigger that uses OLD and NEW qualifiers

4.4 Create an INSTEAD OF trigger

4.5 Disable and enable a database trigger

4.6 Remove a trigger from the database

Relationship to Essential Employability Skills

This course contributes to your program by helping you achieve the following Essential Employability Skills:

EES 3.4	Apply a systematic approach to solve problems. (T, A,)
EES 3.5	Use a variety of thinking skills to anticipate and solve problems. (T, A,)
EES 4.6	Locate, select, organize and document information using appropriate technology and information systems. (T, A,)
EES 4.7	Analyze, evaluate and apply relevant information from a variety of sources. (T, A,)

Relationship to Vocational Learning Outcomes

This course provides the opportunity for you to achieve the following Program Vocational Learning Outcomes (VLO) which will be taught and evaluated at an taught (T), assessed (A) or culminating performance (CP) level:

CPCM - Computer Programmer

VLO 9	Support the analysis and definition of software system specifications based on functional and non-functional requirements. (T, A)
VLO 10	Contribute to the development, documentation, implementation, maintenance and testing of software systems by using industry standard software development methodologies based on defined specifications and existing technologies/frameworks. (T, A)
VLO 12	Model, design, implement, and maintain basic data storage solutions. (T, A)

CPCT - Computer Programmer

VLO 9	Support the analysis and definition of software system specifications based on functional and non-functional requirements. (T, A)

VLO 10	Contribute to the development, documentation, implementation, maintenance and testing of software systems by using industry standard software development methodologies based on defined specifications and existing technologies/frameworks. (T, A)
VLO 12	Model, design, implement, and maintain basic data storage solutions. (T, A)

CPRO - Computer Programmer

VLO 9	Support the analysis and definition of software system specifications based on functional and non-functional requirements. (T, A)
VLO 10	Contribute to the development, documentation, implementation, maintenance and testing of software systems by using industry standard software development methodologies based on defined specifications and existing technologies/frameworks. (T, A)
VLO 12	Model, design, implement, and maintain basic data storage solutions. (T, A)

CSAC - Computer Software and Database Development

VLO 2	Design, model, implement, maintain and query databases using an enterprise-level relational database management system (DBMS) to meet end-user specifications. (T, A)

CSAM - Computer Software and Database Development

VLO 2	Design, model, implement, maintain and query databases using an enterprise-level relational database management system (DBMS) to meet end-user specifications. (T, A)

CSAT - Computer Software and Database Development

VLO 2	Design, model, implement, maintain and query databases using an enterprise-level relational database management system (DBMS) to meet end-user specifications. (T, A)

Learning Resources

Required

Cooper, J. (2022). *Database Programming Using SQL & PL/SQL*. (1st ed.). Cooper Books Inc.
ISBN13: 978-1-7777669-0-0

Student Evaluation

Tests (2 @ 25% each) — 50%
Practice Exercises (10 @ 3% each) — 30%
Comprehensive Projects (4 @ 5% each) — 20%

Grade Scheme

The round off mathematical principle will be used. Percentages are converted to letter grades and grade points as follows:

Mark (%)	Grade	Grade Point	Mark (%)	Grade	Grade Point
94-100	A+	4.0	67-69	C+	2.3
87-93	A	3.7	63-66	C	2.0
80-86	A-	3.5	60-62	C-	1.7
77-79	B+	3.2	50-59	D	1.0
73-76	B	3.0	0-49	F	0.0
70-72	B-	2.7			

Prior Learning Assessment and Recognition

Students who wish to apply for prior learning assessment and recognition (PLAR) need to demonstrate competency at a post-secondary level in all of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- Other: Students interested in PLAR consideration are advised to discuss details with the program coordinator.

Course Related Information

Refer to Program Related Information

Program Related Information

CPRO - Computer Programmer

Program policies pertaining to CSD courses in the CPRO and CSAC programs are posted in D2L for all CSD courses. These policies explain the waiver option as well as policies related to evaluations and classroom conduct. Students are expected to be aware and abide by these policies.

CSAC - Computer Software and Database Development

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College Related Information

Academic Integrity

Lambton College is committed to high ethical standards in all academic activities within the College, including research, reporting and learning assessment (e.g. tests, lab reports, essays).
The cornerstone of academic integrity and professional reputation is principled conduct. All scholastic and academic activity must be free of all forms of academic dishonesty, including copying, plagiarism and cheating.

Lambton College will not tolerate any academic dishonesty, a position reflected in Lambton College policies. Students should be familiar with the Students Rights and Responsibilities Policy, located at lambtoncollege.ca. The policy states details concerning academic dishonesty and the penalties for dishonesty and unethical conduct.

Questions regarding this policy, or requests for additional clarification, should be directed to the Lambton College Student Success Department.

Students with Disabilities

If you are a student with a disability please identify your needs to the professor and/or the Accessibility Centre so that support services can be arranged for you. You can do this by making an appointment at the Accessibility Centre or by arranging a personal interview with the professor to discuss your needs.

Student Rights and Responsibility Policy

Acceptable behaviour in class is established by the instructor and is expected of all students. Any form of misbehaviour, harassment or violence will not be tolerated. Action will be taken as outlined in Lambton College policy.

Date of Withdrawal without Academic Penalty

Please consult the Academic Regulations and Registrar's published dates.

Waiver of Responsibility

Every attempt has been made to ensure the accuracy of this information as of the date of publication. The content may be modified, without notice, as deemed appropriate by the College.

Students should note policies may differ depending on the location of course offering. Please refer to campus location specific policies:

LAMBTON COLLEGE POLICIES – applicable to all Lambton College students.

- Student Rights & Responsibilities & Discipline policy (2000-5-1)
- Test & Exam Writing Protocol (2000-1-6)
- Evaluation of Students (2000-1-3)
- (https://www.lambtoncollege.ca/custom/Pages/Policies/Policies.aspx)

CESTAR COLLEGE:

- https://www.lambtoncollege.ca/Programs/International/Lambton_in_Toronto/Student_Policies/

QUEENS COLLEGE:

- https://www.lambtoncollege.ca/Programs/International/Lambton_in_Mississauga/Student_Policies/

Note: It is the student’s responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.