



## COURSE OUTLINE

<u>IST 222</u> <b>Course Number</b>		PL/SQL Programming <b>Course Title</b>	<u>3</u> <b>Credits</b>
<u>2</u> <b>Class or Lecture Hours</b>	<u>2</u> <b>Laboratory Work Hours</b>	<u>N/A</u> <b>Clinical or Studio Hours</b>	<u>N/A</u> <b>Practicum, Co-op, Internship</b>
			<u>14</u> <b>Course Length (14 week, 10 week, etc.)</b>

Not Applicable  
**Performance on an Examination/Demonstration**  
(Placement Score (if applicable); minimum CLEP score)

Applicable Alternate  
**Delivery Methods** (Online,  
Telecourse [give title of videos])

**Required Materials:**

**Murach's Oracle SQL and PL/SQL for Developers, 2<sup>nd</sup> Edition by Joel Murach.**

**ISBN-13: 978-1890774806**

**ISBN-10: 9781890774806**

**Catalog Description:**

PL/SQL programming teaches students how to create effective SQL queries to extract and update the data in an Oracle database. Students learn how to design and implement a database, giving insight into performance and security issues. Students acquire the essential skills to write complex scripts, stored procedures, functions, and triggers for most application development.

**Prerequisites:** IST 109

**Corequisites:** IST 262

**Last Revised:** 03/05/21

**Course Coordinator (name, email, phone extension):**

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**Available Resources:** (Identify library resources relevant to the course, including books, videos, journals, electronic databases, and recommended websites.)

**Learning Center Resources:** (Are there tutors for the discipline? Study groups?)

**Course Competencies/Goals:**

2. Develop and apply critical thinking habits, becoming more independent, self-directed learners. (Critical Thinking)
3. Apply technology to effectively find, organize, and present ideas. (Technology)
4. Identify an information need then access and retrieve information effectively, efficiently and ethically. (Information Literacy)

**Course-specific General Education Knowledge Goals and Core Skills.****General Education Knowledge Goals**

**Goal 2. Mathematics.** Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

**Goal 4. Technology.** Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

**MCCC Core Skills**

**Goal B. Critical Thinking and Problem-solving.** Students will use critical thinking and problem solving skills in analyzing information.

**Goal D. Information Literacy.** Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

**Goal E. Computer Literacy.** Students will use computers to access, analyze or present information, solve problems, and communicate with others.

**Goal F. Collaboration and Cooperation.** Students will develop the interpersonal skills required for effective performance in group situations

**Course Goals*****The student will be able to:***

- Explain the relational databases and the use of Oracle SQL Developer to run SQL statements (Course **Competencies 2,3;** **Gen Ed Goals 2 & 4;** **Core Skill D&E).**
- Create DML in PL/SQL blocks. Initialize variables with SELECT INTO (Course **Competencies 2, 3, 4;** **Gen Ed Goals 2 & 4;** **Core Skill B, D &E).**
- Discuss how to create tables, indexes, sequences, views and database security management (Course **Competencies 2,3,4;** **Gen Ed Goals 2 & 4;** **Core Skill B, F, D&E).**
- Write PL/SQL code, transactions and locking, stored procedures and functions (Course **Competencies 2,3,4;** **Gen Ed Goals 2 & 4;** **Core Skill B, D &E).**
- Discuss timestamps and intervals, the second one presents large objects (Course **Competencies 2,3,4;** **Gen Ed Goals 2 & 4;** **Core Skill B, D &E).**

***The student will be able to...***

- Explain large data (Course **Competencies 3,4;** **Gen Ed Goals 2 & 4;** **Core Skill B, D &E).**
- Discuss import and export of data (Course **Competencies 2,3,4;** **Gen Ed Goals 2 & 4;** **Core Skill B, D &E).**
- Create Pivot Tables from External data (Course **Competencies 2,3,4;** **Gen Ed Goals 2 & 4;** **Core Skill B, D &E).**

- Use Excel as a database (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

## COURSE CONTENT

### Unit 1

#### **Learning Objectives: Introduction to Relational Database**

##### **The student will be able to:**

- Explain Client/Server System. Explain Relational Database model (Course **Competencies 3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Explain PL/SQL and SQL based systems (Course **Competencies 3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Explain the relationship between PL/SQL and SQL\*Plus (Course **Competencies 3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

### Unit 2

#### **Learning Objectives: How to use Oracle SQL Developer and other tools**

##### **The student will be able to:**

- Start or stop the Oracle database server and listener (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Use SQL\*Plus to run a SQL statement (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Use Oracle SQL Developer to do any of the following (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**):
  - Create a database connection
  - Export or import database connections
  - Navigate through the objects of a database
  - View the column definitions for a table
  - View the data for a table
  - Edit the column definitions for a table
- Use Oracle SQL Developer to enter, run, open, and save SQL statements and scripts (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Use the SQL Reference manual to look up information about SQL statements (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

### Unit 3

#### **Learning Objectives: How to retrieve data from a single table.**

##### **The student will be able to:**

- Code SELECT clause (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Use WHERE, ORDER BY and LIMIT clause (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Create test tables, insert new rows, update and delete existing rows. Code summary queries and subqueries (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Distinguish between the base table values and the calculated values in SELECT statements (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of a column alias (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of the concatenation operator in string expressions (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the order of precedence and the use of parentheses for arithmetic expressions (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of scalar functions (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of the Dual table, the DISTINCT keyword, and the ROWNUM pseudo column (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of the IN, BETWEEN, and LIKE operators in WHERE clauses (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of IS NULL in a WHERE clause (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

### Unit 4

#### **Learning Objectives: How to retrieve data from two or more tables**

##### **The student will be able to:**

- Explain when column names need to be qualified (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the proper use of a table alias (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the differences between an inner join, a left outer join, a right outer join, a full outer join, and a cross join (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Explain why you do not need to use right outer joins (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of the implicit syntax for coding joins (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of the USING and NATURAL keywords for coding joins (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of unions including the use of the MINUS and INTERSECT operators (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

### Unit 5

#### **Learning Objectives: How to code summary queries**

##### **The student will be able to:**

- Code summary queries that use aggregate functions, including the use of the ROLLUP and CUBE operators (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the differences between the HAVING clause and the WHERE clause (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

## Unit 6

### **Learning Objectives: How to code subqueries**

#### **The student will be able to:**

- Describe the way subqueries can be used in the WHERE, HAVING, FROM and SELECT clauses of a SELECT statement (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the difference between a correlated subquery and a noncorrelated subquery (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

## Unit 7

### **Learning Objectives: How to insert, update, and delete data**

#### **The student will be able to:**

- Describe the use of the COMMIT and ROLLBACK statements when you are using INSERT, UPDATE, and DELETE statements (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Explain how to handle null values and default values when coding INSERT and UPDATE statements (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

## Unit 8

### **Learning Objectives: How to work with data types and functions**

#### **The student will be able to:**

- Describe the data that can be stored in any of the character, numeric, date/time, and large object data types (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe how the use of functions can solve the problems associated with (1) sorting string data that contains numeric values, and (2) doing date or time(Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

## Unit 9

### **Learning Objectives: How to design a database**

#### **The student will be able to:**

- Give three criteria for when a column should be indexed (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe referential integrity (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Explain how Oracle uses declarative referential integrity to prevent deletion, insertion, and update problems (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Explain how normalizing a database to the third normal form affects database performance (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

**Unit 10****Learning Objectives: How to create tables, indexes, and sequences****The student will be able to:**

- Describe how each of these types of constraints restricts the values that can be stored in a table: not null, unique, primary key, foreign key, and check (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the difference between a column-level constraint and a table-level constraint (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of an index (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of a sequence (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of a script for creating the tables of a data structure (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

**Unit 11****Learning Objectives: How to create views and manage database security****The student will be able to:**

- Describe a view (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the benefits of using views (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Given a view, determine whether it is updatable (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the effect of the WITH CHECK OPTION clause on an updatable view (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Distinguish between system privileges and object privileges (Course **Competencies 2,3,4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe what a user can do when given any of these privileges for an Oracle object: Select Update, Insert, Delete, and Execute (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe how the table space allocation for a user affects what the user can do (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Distinguish between public and private synonyms (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).

**Unit 12****Learning Objectives: How to write PL/SQL code****The student will be able to:**

- Describe the use of a cursor (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the three types of PL/SQL collections: arrays, nested tables, and associative arrays (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe a predefined exception and the procedure for handling one (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the scopes of regular variables and bind variables (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Distinguish between a bind variable and a substitution variable (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of dynamic and bind variables SQL (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Distinguish between a bind variable and a substitution variable (Course **Competencies 2, 3, 4; Gen Ed Goals 2 & 4; Core Skill B, D &E**).
- Describe the use of dynamic SQL.

<b>Evaluation of Student Learning</b>	<b>Grade</b>
Quizzes	10
Projects and laboratory assignments	50
Units of Tests: Module One (Units I, II, III)	10
Module Two (Units IV, V, VI)	10
Module Three (Units VII, VIII, IX)	10
Module Three (Units VII, VIII, IX)	10
<b>Total</b>	<b>100</b>