

Idaho PTE Business Education Course with Essential Learning Outcomes and Learning Indicators

Course Title	COMPUTER SCIENCE-DATABASE DESIGN AND PROGRAMMING		
SDPTE Course ID	BE 0261	IBED	IBED 10157

This course is an authorized AP College Board course - teachers must be authorized to teach the course through the AP College Board. Upon completion of the course, students will be able to pass the AP College Board Exam for Computer Science A or Computer Science AB. For complete details regarding AP Board Approval of the Teacher and the curriculum go to: <http://apcentral.collegeboard.com>

Term	One Year	Preq	
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Notes:

Business Law *BLaw_7: Demonstrate Knowledge of Computer Law*

BLaw_7.1 Explain how the advances in computer technology impact upon such areas as property law, contract law, criminal law, and international law.

Learning Indicator: BLaw_7.1.1	Define the key terms and new issues involved in computer law including security, privacy, computer crime and viruses
Learning Indicator: BLaw_7.1.2	Determine when a computer program can be protected by a patent or a copyright and explain the steps in applying for each
Learning Indicator: BLaw_7.1.3	Identify the circumstances under which the copyright of a computer program has been violated
Learning Indicator: BLaw_7.1.4	Determine when computer-related contracts are service contracts and when they are sale of goods contracts
Learning Indicator: BLaw_7.1.5	Outline the various claims and defenses that are available in civil suits involving computer contracts
Learning Indicator: BLaw_7.1.6	Explain how common law, constitutional law, statutory law, and administrative regulations can be used to prevent the use of computers to invade privacy
Learning Indicator: BLaw_7.1.7	Outline the various types of federal and state statutes designed to combat computer crime
Learning Indicator: BLaw_7.1.8	Discuss the impact of the law of different countries and the impact of international law on computer law

Information Systems *IS_12: Demonstrate Knowledge of Programming*

IS_12.1 Demonstrate knowledge of computer history.

Learning Indicator: IS_12.1.1	Give a brief history of computers
Learning Indicator: IS_12.1.2	Describe how hardware and software make up computer architecture
Learning Indicator: IS_12.1.3	Describe the binary representation of data and programs in computers
Learning Indicator: IS_12.1.4	Discuss the evolution of programming languages
Learning Indicator: IS_12.1.5	Describe the software development process
Learning Indicator: IS_12.1.6	Discuss the fundamental concepts of object-oriented programming

IS_12.2 Demonstrate ability to create a simple computer program.

Learning Indicator: IS_12.2.1	Describe the structure of a simple program
Learning Indicator: IS_12.2.2	Write a simple program - hello world
Learning Indicator: IS_12.2.3	Edit, compile, and run a program
Learning Indicator: IS_12.2.4	Format a program to give a pleasing, consistent appearance
Learning Indicator: IS_12.2.5	Locate compile-time errors

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Learning Indicator: IS_12.2.6 Write a simple graphics program

IS_12.3 Identify syntax and errors, and demonstrate the ability to debug.

Learning Indicator: IS_12.3.1 Construct and use numeric and string literals

Learning Indicator: IS_12.3.2 Name and use variables constraints

Learning Indicator: IS_12.3.3 Create arithmetic expressions

Learning Indicator: IS_12.3.4 Know the precedence of different arithmetic operators

Learning Indicator: IS_12.3.5 Concatenate two strings or a number and a string

Learning Indicator: IS_12.3.6 Know how and when to use comments in a program

Learning Indicator: IS_12.3.7 Tell the difference between syntax errors, run-time errors, and logic errors

Learning Indicator: IS_12.3.8 Insert output statements to debug a program

Learning Indicator: IS_12.3.9 Differentiate between Cartesian coordinates and screen coordinates

Learning Indicator: IS_12.3.10 Work with color and text properties

IS_12.4 Demonstrate ability to use basic control statements.

Learning Indicator: IS_12.4.1 Use the increment and decrement operators

Learning Indicator: IS_12.4.2 Use standard math methods

Learning Indicator: IS_12.4.3 Use if and if-else statements to make choices

Learning Indicator: IS_12.4.4 Use while and for loops to repeat a process

Learning Indicator: IS_12.4.5 Construct appropriate conditions for control statements using relational operators

Learning Indicator: IS_12.4.6 Detect and correct common errors involving loops

IS_12.5 Demonstrate ability to use classes in Object Oriented Programming.

Learning Indicator: IS_12.5.1 Design and implement a simple class from user requirements

Learning Indicator: IS_12.5.2 Organize a program in terms of a view class and a model class

Learning Indicator: IS_12.5.3 Use visibility modifiers to make methods visible to clients and restrict access to data within a class

Learning Indicator: IS_12.5.4 Write appropriate mutator methods, accessor methods, and constructors for a class

Learning Indicator: IS_12.5.5 Describe how parameters transmit data to methods

Learning Indicator: IS_12.5.6 Use instance variable, local variables, and parameters appropriately

Learning Indicator: IS_12.5.7 Organize a complex task in terms of helper methods

IS_12.6 Demonstrate ability to use Advanced Control Statements.

Learning Indicator: IS_12.6.1 Construct complex Boolean expressions using logical operators && || and !

Learning Indicator: IS_12.6.2 Construct truth tables for Boolean expressions

Learning Indicator: IS_12.6.3 Defend the logic of nested if statements and extended if statements

Learning Indicator: IS_12.6.4 Test if statements in a comprehensive manner

Learning Indicator: IS_12.6.5 Construct nested loops

Learning Indicator: IS_12.6.6 Create appropriate test cases for if statements and loops

Learning Indicator: IS_12.6.7 Explain the purpose of assertions, invariants, and loop verification

IS_12.7 Demonstrate ability to use User Interfaces.

Learning Indicator: IS_12.7.1 Construct a query-driven terminal interface

Learning Indicator: IS_12.7.2 Construct a menu driven terminal interface

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Learning Indicator: IS_12.7.3 Construct a graphical user interface

Learning Indicator: IS_12.7.4 Format text, including numbers, for output

Learning Indicator: IS_12.7.5 Handle number format exceptions during input

IS_12.8 Demonstrate ability to use Applets.

Learning Indicator: IS_12.8.1 Convert a Java Application to an applet and embed in a Web page

Learning Indicator: IS_12.8.2 Identify the constraints on applets that distinguish them from Java applications

IS_12.9 Demonstrate ability to use Basic Array Concepts.

Learning Indicator: IS_12.9.1 Write programs that handle collections of similar items

Learning Indicator: IS_12.9.2 Declare array variables and instantiate array objects

Learning Indicator: IS_12.9.3 Manipulate arrays with loops, including the enhanced for loop

Learning Indicator: IS_12.9.4 Write methods to manipulate arrays

Learning Indicator: IS_12.9.5 Create parallel arrays and two-dimensional arrays

IS_12.10 Demonstrate ability to use Advanced Object Oriented Class Concepts.

Learning Indicator: IS_12.10.1 Know when it is appropriate to include class variables and methods in a class

Learning Indicator: IS_12.10.2 Understand the role of Java interfaces in a software system and define an interface for a set of implementing classes

Learning Indicator: IS_12.10.3 Describe the use of inheritance by extending a class

Learning Indicator: IS_12.10.4 Describe the use of polymorphism and know how to override methods in a superclass

Learning Indicator: IS_12.10.5 Place the common features (variables and methods) of a set of classes in an abstract class

Learning Indicator: IS_12.10.6 State the implications of reference types of equality, copying, and mixed-mode operations

Learning Indicator: IS_12.10.7 Define and use methods that have preconditions, postconditions, and throw exceptions

IS_12.11 Demonstrate ability to use Advanced Arrays Concepts.

Learning Indicator: IS_12.11.1 Use string methods appropriately

Learning Indicator: IS_12.11.2 Write a method for searching an array

Learning Indicator: IS_12.11.3 Describe why a sorted array can be searched more efficiently than an unsorted array

Learning Indicator: IS_12.11.4 Write a method to sort an array

Learning Indicator: IS_12.11.5 Write methods to perform insertions and removals at given positions in an array

Learning Indicator: IS_12.11.6 Explain the issues involved when working with arrays of objects

Learning Indicator: IS_12.11.7 Perform simple operations with Java's Array List class

IS_12.12 Demonstrate ability to use Recursion, Searching, and Sorting.

Learning Indicator: IS_12.12.1 Design and implement a recursive method to solve a problem

Learning Indicator: IS_12.12.2 Differentiate between recursive and interactive solutions of a problem

Learning Indicator: IS_12.12.3 Check and test a recursive method for correctness.

Learning Indicator: IS_12.12.4 Explain how a computer executes a recursive method

Learning Indicator: IS_12.12.5 Perform a simple complexity analysis an algorithm using big-O notation

Learning Indicator: IS_12.12.6 Recognize some typical orders of complexity

Learning Indicator: IS_12.12.7 Interpret the behavior of a complex sort algorithm such as quicksort

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IS_12.13 Demonstrate ability to use Object-Oriented Analysis & Design.

Learning Indicator: IS_12.13.1	Describe the general role of analysis and design in the software development process
Learning Indicator: IS_12.13.2	Given a problem's description, pick out the classes and their attributes
Learning Indicator: IS_12.13.3	Describe the role of a graphical notation such as Unified Modeling Language (UML) in object-oriented analysis and design
Learning Indicator: IS_12.13.4	Interpret simple class diagrams and their basic features
Learning Indicator: IS_12.13.5	Differentiate between aggregation, inheritance, and other relationships among classes
Learning Indicator: IS_12.13.6	Given the description of an activity and its collaboration diagram, write a narrative or pseudo code for that activity

IS_12.14 Demonstrate ability to use Lists.

Learning Indicator: IS_12.14.1	Distinguish fundamental categories of collections, such as linear, hierarchical, graph, and unordered
Learning Indicator: IS_12.14.2	Describe the basic features of lists and their applications
Learning Indicator: IS_12.14.3	Use the List interface and the major list implementation classes
Learning Indicator: IS_12.14.4	Recognize the difference between index-based operations and content-based operations on a list
Learning Indicator: IS_12.14.5	Describe the restrictions on the use of list operations

IS_12.15 Demonstrate ability to use Stacks and Queues.

Learning Indicator: IS_12.15.1	Interpret the behavior of a stack and recognize applications in which a stack would be useful
Learning Indicator: IS_12.15.2	Interpret the behavior of a queue and recognize applications in which a queue would be useful
Learning Indicator: IS_12.15.3	Interpret the behavior of a priority queue and recognize applications in which a priority queue would be useful

IS_12.16 Demonstrate ability to use Sets and Maps.

Learning Indicator: IS_12.16.1	Identify the basic features of sets and their applications
Learning Indicator: IS_12.16.2	Use the set interface and the set implementation class
Learning Indicator: IS_12.16.3	Differentiate between a set and a sorted set
Learning Indicator: IS_12.16.4	Recognize the basic features of maps and their applications
Learning Indicator: IS_12.16.5	Use the map interface and the map implementation class
Learning Indicator: IS_12.16.6	Differentiate between a map and a sorted map
Learning Indicator: IS_12.16.7	Describe the general features of collections
Learning Indicator: IS_12.16.8	Use the collection interface

IS_12.17 Demonstrate ability to Implement Lists.

Learning Indicator: IS_12.17.1	Use an array to implement and indexed list
Learning Indicator: IS_12.17.2	Use a singly linked structure to implement an indexed list
Learning Indicator: IS_12.17.3	Use an array to implement a positional list
Learning Indicator: IS_12.17.4	Use a doubly linked structure to implement a positional list
Learning Indicator: IS_12.17.5	Describe the run-time and memory trade-offs of array-based and link-based implementations of linear collections

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IS_12.18 Demonstrate ability to Implement Sets and Maps.

Learning Indicator: IS_12.18.1	Explain why a list implementation of sets and maps is simple but inefficient
Learning Indicator: IS_12.18.2	Develop hash functions to implement sets and maps
Learning Indicator: IS_12.18.3	Utilize different strategies for resolving collisions during hashing.
Learning Indicator: IS_12.18.4	Describe why a hashing implementation of sets and maps can be very efficient

IS_12.19 Demonstrate ability to Implement Trees & Priority Queues.

Learning Indicator: IS_12.19.1	Use the appropriate terminology to describe trees
Learning Indicator: IS_12.19.2	Distinguish different types of hierarchical collections, such as general trees, binary trees, binary search trees, and heaps
Learning Indicator: IS_12.19.3	Describe the basic tree traversals
Learning Indicator: IS_12.19.4	Use binary search trees to implement sorted sets and sorted maps
Learning Indicator: IS_12.19.5	Use heaps to implement priority queues

Information Systems IS_15: Demonstrate Knowledge of Database Design

IS_15.1 Demonstrate knowledge and the use of Elements for Database Design.

Learning Indicator: IS_15.1.1	Identify and examine data
Learning Indicator: IS_15.1.2	List reasons for significance of data and tracing and sorting
Learning Indicator: IS_15.1.3	Measure importance of describing information requirements
Learning Indicator: IS_15.1.4	Distinguish between a conceptual model and physical implementation
Learning Indicator: IS_15.1.5	Define and give an example of an entity
Learning Indicator: IS_15.1.6	Distinguish between an entity and an instance of an entity
Learning Indicator: IS_15.1.7	Identify aspects of a business about which data must be known
Learning Indicator: IS_15.1.8	Name and describe attributes for a given entity
Learning Indicator: IS_15.1.9	Distinguish between an attribute and its value
Learning Indicator: IS_15.1.10	Select and justify a unique identifier (UID) for an entity
Learning Indicator: IS_15.1.11	Identify an entity relationship diagram (ERD)
Learning Indicator: IS_15.1.12	List the major types of databases
Learning Indicator: IS_15.1.13	Interpret and describe relationship optionality
Learning Indicator: IS_15.1.14	Interpret and describe relationship cardinality
Learning Indicator: IS_15.1.15	Related entities by applying the rules of cardinality and optionality

IS_15.2 Demonstrate the ability to create an Entity Relationship Diagram (ERD).

Learning Indicator: IS_15.2.1	Interpret and name entity relationships
Learning Indicator: IS_15.2.2	Distinguish between data and information and provide examples of each
Learning Indicator: IS_15.2.3	Describe and give an example of how data becomes information
Learning Indicator: IS_15.2.4	Identify and construct relationships using the matrix diagram
Learning Indicator: IS_15.2.5	Demonstrate drawing ERDs
Learning Indicator: IS_15.2.6	Label relationship using ERDish terminology

IS_15.3 Demonstrate knowledge of Entity Relationship details.

Learning Indicator: IS_15.3.1	Demonstrate the five key steps for establishing a relationship
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Learning Indicator: IS_15.3.2	Describe and give examples of relationship nontransferability
Learning Indicator: IS_15.3.3	Construct an example of a one-to-one relationship and explain the considerations for this type of relationship
Learning Indicator: IS_15.3.4	Construct an example of a many-to-man relationship and explain the considerations for this type of relationship
Learning Indicator: IS_15.3.5	Construct an example of a redundant relationship when appropriate
Learning Indicator: IS_15.3.6	Identify and solve the problem of an attribute hiding a relationship
Learning Indicator: IS_15.3.7	Demonstrate the steps to resolve a many-to-many relationship using an intersection entity
Learning Indicator: IS_15.3.8	Identify the UID of an intersection entity and represent it in the entity relationship
Learning Indicator: IS_15.3.9	Define the purpose of normalization in the database model
Learning Indicator: IS_15.3.10	List and define the rule of First Normal Form in the normalization process

IS_15.4 Demonstrate knowledge of business rule constraints.

Learning Indicator: IS_15.4.1	Review the different types of unique identifiers (UIDs)
Learning Indicator: IS_15.4.2	Apply the rules of UIDs and identify UIDs for entities in an existing model
Learning Indicator: IS_15.4.3	Analyze business rules and justify the creation of artificial UID, composite UID, or secondary UI
Learning Indicator: IS_15.4.4	Identify transitive dependencies in a data model
Learning Indicator: IS_15.4.5	List and define the rule of Third Normal Form
Learning Indicator: IS_15.4.6	Apply the rule of Third Normal Form
Learning Indicator: IS_15.4.7	Recognize and discuss the issues of identification in the real world
Learning Indicator: IS_15.4.8	Define the term "constraint" as it applies to data modeling
Learning Indicator: IS_15.4.9	Identify an exclusive OR relationship in a business scenario
Learning Indicator: IS_15.4.10	Diagram ARC constrains to represent an exclusive or relationship
Learning Indicator: IS_15.4.11	Distinguish between the use of an arc and a subtype in the data model
Learning Indicator: IS_15.4.12	Defend and give an example of a hierarchical relationship
Learning Indicator: IS_15.4.13	Identify business examples of recursive relationships

IS_15.5 Demonstrate knowledge and apply modeling change in a database design.

Learning Indicator: IS_15.5.1	Distinguish between using date as an attribute and DAY as an entity in a data model, depending on business requirements
Learning Indicator: IS_15.5.2	Solve the problem of keeping characteristics of a date by constructing a model that uses DAY as an entity
Learning Indicator: IS_15.5.3	Identify at least three time-related constraints that can result from a time sensitive model
Learning Indicator: IS_15.5.4	Define and give an example of conditional nontransferability in a time-constraint
Learning Indicator: IS_15.5.5	Solve the business requirement of tracking changes in price or values by constructing a model that uses a historical entity
Learning Indicator: IS_15.5.6	Describe the meaning of journaling/logging
Learning Indicator: IS_15.5.7	Apply the rule of using DATE as an entity successfully

IS_15.6 Describe the terminology mapping between a conceptual model and a relational database model.

Learning Indicator: IS_15.6.1	Apply the rule of basic mapping to transform n entity into a table
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Learning Indicator: IS_15.6.2	Apply the rule of relationship mapping to correctly transform one-to-many and barred relationships
Learning Indicator: IS_15.6.3	Apply the rule of relationship mapping to correctly transform many-to-many relationships
Learning Indicator: IS_15.6.4	Apply the rule of relationship mapping to correctly transform one-to-one relationships

Information Systems IS_16: Demonstrate Knowledge of Database SQL Programming

IS_16.1 Demonstrate knowledge and use of the Elements of basic SQL Select Statements.

Learning Indicator: IS_16.1.1	Create a basic SELECT statement
Learning Indicator: IS_16.1.2	Use the correct syntax to display all rows in a table
Learning Indicator: IS_16.1.3	Use the correct syntax to select specific columns in a table, modify the way data is displayed, and perform calculations using arithmetic expressions and operators
Learning Indicator: IS_16.1.4	Formulate queries using correct operator precedence
Learning Indicator: IS_16.1.5	Define a null Value
Learning Indicator: IS_16.1.6	Demonstrate the effect null values create in arithmetic expressions
Learning Indicator: IS_16.1.7	Construct a query using a column alias

IS_16.2 Demonstrate ability to restrict and sort data.

Learning Indicator: IS_16.2.1	Apply concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression
Learning Indicator: IS_16.2.2	Enter literal values of the type character, number, or date into a SELECT statement
Learning Indicator: IS_16.2.3	Define and use DISTINCT to eliminate duplication rows
Learning Indicator: IS_16.2.4	Display the structure of a table using DESCRIBE or DESC
Learning Indicator: IS_16.2.5	Apply SQL syntax to restrict the rows returned from a query
Learning Indicator: IS_16.2.6	Demonstrate application of the WHERE clause syntax
Learning Indicator: IS_16.2.7	Explain why it is important, from a business perspective, to be able to easily limit data retrieved from a table
Learning Indicator: IS_16.2.8	Construct and produce output using a SQL query containing character strings and date values
Learning Indicator: IS_16.2.9	Apply the proper comparison operator to return a desired result
Learning Indicator: IS_16.2.10	Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result
Learning Indicator: IS_16.2.11	Distinguish between zero and the value of NULL as unavailable, unassigned, unknown, or inapplicable
Learning Indicator: IS_16.2.12	Explain the use of comparison conditions and NULL

IS_16.3 Demonstrate knowledge and use of Logical Comparisons & sorting.

Learning Indicator: IS_16.3.1	Evaluate logical comparisons to restrict the rows returned based on two or more conditions
Learning Indicator: IS_16.3.2	Apply the rules of precedence to determine the order in which expressions are evaluated and calculated
Learning Indicator: IS_16.3.3	Construct a query to sort a results set in ascending or descending order
Learning Indicator: IS_16.3.4	State the order in which expressions are evaluated and calculated based on the rules of precedence

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Learning Indicator: IS_16.3.5 Construct a query to order a results set using a column alias

Learning Indicator: IS_16.3.6 Construct a query to order a results set for single or multiple columns

Learning Indicator: IS_16.3.7 Classify a function as a single-row or multi-row function

IS_16.4 Demonstrate knowledge and use of SQL Functions.

Learning Indicator: IS_16.4.1 Differentiate between single-row functions and multi-row functions and the result returned by each

Learning Indicator: IS_16.4.2 Differentiate between operations of single-row functions and multiple-row functions

Learning Indicator: IS_16.4.3 Select and apply single-row functions that perform case conversion and/or character manipulation

Learning Indicator: IS_16.4.4 Select and apply character-manipulation functions CONCAT, SUBSTR, LENGTH, INSTR, LPAD, RPAD, TRIM, and REPLACE in a SQL query

Learning Indicator: IS_16.4.5 Select and apply the single-row number functions ROUND, TRUNC, and MOD in a SQL query

Learning Indicator: IS_16.4.6 Distinguish between the results obtained when TRUNC is applied to a numeric value and ROUND is applied to a numeric value

Learning Indicator: IS_16.4.7 State the implications for business when applying TRUNC and ROUND to numeric values

Learning Indicator: IS_16.4.8 Select and apply the single-row functions MONTHS_BETWEEN, ADD_MONTHS, NEXT_DAY, LAST_DAY, ROUND, and TRUNC that operate on date data

Learning Indicator: IS_16.4.9 Demonstrate proper use of the arithmetic operators with dates

Learning Indicator: IS_16.4.10 Demonstrate the use of SYSDATE and date functions

Learning Indicator: IS_16.4.11 State the implications for world businesses to be able to easily manipulate data stored in date format

Learning Indicator: IS_16.4.12 Give an example of an explicit data-type conversion and an implicit data-type conversion

Learning Indicator: IS_16.4.13 Explain why it is important, from a business perspective, for a language to have built-in data-conversion capabilities

Learning Indicator: IS_16.4.14 Construct a SQL query that correctly applies TO_CHAR, TO_NUMBER, and TO_DATE single-row functions to produce a desired result

Learning Indicator: IS_16.4.15 Apply the appropriate date and/or character format model to produce a desired output

Learning Indicator: IS_16.4.16 Explain and apply the use of YYYY and RRRR to return the correct year as stored in the database

Learning Indicator: IS_16.4.17 Demonstrate and explain the evaluation of a nested function

Learning Indicator: IS_16.4.18 List at least four general functions that work with any data type and relate to handling null values

Learning Indicator: IS_16.4.19 Explain the use of the COALESCE and the NVL functions

Learning Indicator: IS_16.4.20 Explain the use of general functions to deal with null values in data

Learning Indicator: IS_16.4.21 Construct and execute a SQL query that correctly applies NVL, NVL2, NULLIF, and COALESCE single-row functions

Learning Indicator: IS_16.4.22 Compare and contrast the DECODE and CASE functions

Learning Indicator: IS_16.4.23 Construct and execute a SQL query that correctly uses the DECODE and CASE functions

Learning Indicator: IS_16.4.24 Construct and execute two methods for implementing IF-THEN-ELSE conditional logic

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Learning Indicator: IS_16.4.25	Demonstrate 70% mastery for Database Programming Quiz 1
Learning Indicator: IS_16.4.26	Describe the purpose of join conditions
Learning Indicator: IS_16.4.27	Construct and execute a SELECT statement that results in a Cartesian product
Learning Indicator: IS_16.4.28	Construct and execute SELECT statements to access data from more than one table using an equijoin
Learning Indicator: IS_16.4.29	Construct and execute SELECT statements that add search conditions using the AND operator

IS_16.5 Demonstrate ability to display data from multiple tables.

Learning Indicator: IS_16.5.1	Apply the rule for using column aliases in a join statement
Learning Indicator: IS_16.5.2	Construct and execute a SELECT statement to access data from more than one table using a nonequijoin
Learning Indicator: IS_16.5.3	Create and execute a SELECT statement to access data from more than one table using an outer join
Learning Indicator: IS_16.5.4	Build positive associations between learning and work
Learning Indicator: IS_16.5.5	Construct and execute a SELECT statement to join a table to itself using a self-join
Learning Indicator: IS_16.5.6	Compose and execute a natural join using SQL join syntax
Learning Indicator: IS_16.5.7	Create a Cartesian product using SQL join syntax
Learning Indicator: IS_16.5.8	Define the relationship between a cross-join and a Cartesian product
Learning Indicator: IS_16.5.9	Define the relationship between a natural join and an equijoin
Learning Indicator: IS_16.5.10	Explain why it is important to have a standard for SQL as defined by ANSI
Learning Indicator: IS_16.5.11	Compose and execute a join with the USING and ON clauses
Learning Indicator: IS_16.5.12	Compose and execute an ANSI/ISO SQL: 1999 query that joins three tables
Learning Indicator: IS_16.5.13	Compare and contrast an inner and an outer join
Learning Indicator: IS_16.5.14	Construct and execute a query to use a left outer join
Learning Indicator: IS_16.5.15	Construct and execute a query to use a right outer join
Learning Indicator: IS_16.5.16	Construct and execute a query to use a full outer join
Learning Indicator: IS_16.5.17	Construct and execute a query to use an inner join

IS_16.6 Demonstrate knowledge and use of Group Functions in SQL.

Learning Indicator: IS_16.6.1	Group Functions, COUNT, DISTINCT, and NVL
Learning Indicator: IS_16.6.2	Define and give an example of the seven group functions: AVG, COUNT, MAX, MIN, STDDEV, SUM, VARIANCE
Learning Indicator: IS_16.6.3	Construct and execute a SQL query using SELECT, FROM, WHERE, GROUP BY, ORDER BY syntax using group functions
Learning Indicator: IS_16.6.4	Construct and execute group functions that operate only with numeric data types
Learning Indicator: IS_16.6.5	Construct and execute group functions that operate only with numeric data types
Learning Indicator: IS_16.6.6	Construct and execute group functions that operate to produce a single value
Learning Indicator: IS_16.6.7	Compare and contrast the result set obtained from single-row functions versus group functions
Learning Indicator: IS_16.6.8	Construct and execute a SQL query applying COUNT, DISTINCT, NVL group functions

IS_16.7 Demonstrate ability to aggregating data using SQL Group Functions.

Learning Indicator: IS_16.7.1	Construct and execute a SQL query applying GROUP BY
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Learning Indicator: IS_16.7.2	Construct and execute a SQL query applying HAVING
Learning Indicator: IS_16.7.3	State the purpose of the GROUP BY clause for aggregate functions
Learning Indicator: IS_16.7.4	State the purpose of the HAVING clause for aggregate functions
Learning Indicator: IS_16.7.5	Demonstrate 70% mastery for Database Programming Quiz 3
Learning Indicator: IS_16.7.6	Define and explain the function of subqueries for retrieving data
Learning Indicator: IS_16.7.7	Construct and execute a single-row subquery in the WHERE clause
Learning Indicator: IS_16.7.8	Provide evidence to support the assigned topic: what types of questions can be answered using a subquery that can't be answered by running multiple queries?
Learning Indicator: IS_16.7.9	Construct and execute a single-row subquery in the WHERE clause or HAVING clause
Learning Indicator: IS_16.7.10	Construct and execute a SELECT statement using more than one subquery
Learning Indicator: IS_16.7.11	Construct and execute a SELECT statement using a group function in the subquery
Learning Indicator: IS_16.7.12	Name and give an example of the two types of subqueries

IS_16.8 Demonstrate knowledge of Subqueries, producing readable output and Manipulate Data with SQL.

Learning Indicator: IS_16.8.1	Apply the correct comparison operator to produce the desired result using a multiple-row subquery
Learning Indicator: IS_16.8.2	Construct and execute a multiple-row subquery in the WHERE clause or HAVING clause
Learning Indicator: IS_16.8.3	Distinguish between the application of single-row and multiple-row subqueries
Learning Indicator: IS_16.8.4	Explain the function of the capabilities of the data manipulation language
Learning Indicator: IS_16.8.5	Define and give an example of a common business "transaction"
Learning Indicator: IS_16.8.6	Construct and execute INSERT statements for an explicit basic insert, copying rows from another table, and using a subquery
Learning Indicator: IS_16.8.7	Construct and execute INSERT statements that define special values, null values, and date values
Learning Indicator: IS_16.8.8	Construct and execute an UPDATE statement
Learning Indicator: IS_16.8.9	Construct and execute a DELETE statement
Learning Indicator: IS_16.8.10	Explain how foreign-key and primary-key integrity constraints affect UPDATE and DELETE statements
Learning Indicator: IS_16.8.11	Construct and execute a query that uses a subquery to update and delete data from a table
Learning Indicator: IS_16.8.12	Relate how DML statements are used in real-world situations

IS_16.9 Demonstrate ability to Create and Manage Tables with SQL.

Learning Indicator: IS_16.9.1	Construct and execute a MERGE statement
Learning Indicator: IS_16.9.2	List and provide an example of each of the number, character, and date data types
Learning Indicator: IS_16.9.3	Create a table applying the appropriate data type for each column
Learning Indicator: IS_16.9.4	List and provide an example of each of the number, character, and date data types
Learning Indicator: IS_16.9.5	Create a table applying the appropriate data type for each column
Learning Indicator: IS_16.9.6	Create a table incorporating TIMESTAMP, INTERVAL YEAR TO MONTH, and INTERVAL DAY TO SECOND data types to columns.
Learning Indicator: IS_16.9.7	Provide evidence to support the assigned topic "How might an organization use time stamps and time zones in business situations?"
Learning Indicator: IS_16.9.8	Articulate the changing nature of work and its associated educational requirements

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IS_16.10 Demonstrate ability to use Database Data Definition Language.

Learning Indicator: IS_16.10.1	Explain and give an example for each of the DDL statements ALTER, DROP, RENAME, and TRUNCATE and the effect each has on tables and columns
Learning Indicator: IS_16.10.2	Explain why it is important to be able to modify a table
Learning Indicator: IS_16.10.3	Construct a query and execute the ALTER TABLE commands ADD, MODIFY, and DROP
Learning Indicator: IS_16.10.4	Explain the rationale for using TRUNCATE vs. DELETE for tables
Learning Indicator: IS_16.10.5	Add a comment to a table using the COMMENT ON TABLE command
Learning Indicator: IS_16.10.6	Name the changes that can and cannot be made to modify a column
Learning Indicator: IS_16.10.7	List the guidelines for dropping a column when constraints are present
Learning Indicator: IS_16.10.8	Explain when and why the SET UNUSED statement is advantageous
Learning Indicator: IS_16.10.9	List the guidelines related to using a DROP TABLE statement

IS_16.11 Demonstrate ability to create and use Database Constraints.

Learning Indicator: IS_16.11.1	Define the term "constraint" as it relates to data integrity
Learning Indicator: IS_16.11.2	Define and give an example of a NOT NULL and a UNIQUE constraint
Learning Indicator: IS_16.11.3	Name two reasons why constraints are incorporated into table definitions
Learning Indicator: IS_16.11.4	Provide evidence to support the assigned topic: "Why is it important, from a business perspective, for a language to have built-in constraint-checking capability?"
Learning Indicator: IS_16.11.5	Evaluate a business problem to create a new table with NOT NULL and UNIQUE constraints and write the code to provide a solution
Learning Indicator: IS_16.11.6	Define and give an example of a PRIMARY KEY, FOREIGN KEY, and CHECK constraint
Learning Indicator: IS_16.11.7	Explain the purpose of defining PRIMARY KEY, FOREIGN KEY, and CHECK constraints
Learning Indicator: IS_16.11.8	Demonstrate the creation of constraints at the column level and table level in a CREATE TABLE statement
Learning Indicator: IS_16.11.9	Evaluate a business problem requiring the addition of a PRIMARY KEY and FOREIGN KEY constraint and write the code to execute the change
Learning Indicator: IS_16.11.10	Query the data dictionary for USER_CONSTRAINTS and interpret the information returned
Learning Indicator: IS_16.11.11	Contrast constraint checking versus constraint management
Learning Indicator: IS_16.11.12	List three different functions that the ALTER statement can perform on constraints
Learning Indicator: IS_16.11.13	Provide evidence to support the assigned topic: "What are the different activities that a database administrator might perform with regard to constraints?"
Learning Indicator: IS_16.11.14	Name a business function that would require a DBA to drop, enable, and/or disable a constraint or use the CASCADE syntax
Learning Indicator: IS_16.11.15	Evaluate a business problem to modify an existing table with new constraints and write the code to resolve the problem

IS_16.12 Demonstrate ability to create and maintaining Database Views.

Learning Indicator: IS_16.12.1	List three uses for views from the standpoint of a database administrator
Learning Indicator: IS_16.12.2	Explain, from a business perspective, why it is important to be able to create and use logical subsets of data derived from one or more tables
Learning Indicator: IS_16.12.3	Create a view with and without column aliases in the subquery using a single base table
Learning Indicator: IS_16.12.4	Create a complex view that contains group functions to display values from two tables

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Learning Indicator: IS_16.12.5	Retrieve data from a view
Learning Indicator: IS_16.12.6	Write and execute a query that modifies a view
Learning Indicator: IS_16.12.7	Evaluate a business problem to create a new view and write the code to resolve the problem
Learning Indicator: IS_16.12.8	Write and execute a query that performs DML operations on a simple view
Learning Indicator: IS_16.12.9	Name the conditions that restrict modifying a view using DML operations
Learning Indicator: IS_16.12.10	Write and execute a query using the WITH CHECK OPTION clause
Learning Indicator: IS_16.12.11	Explain the use of WITH CHECK OPTION as it applies to integrity constraints and data validation
Learning Indicator: IS_16.12.12	Apply the WITH READ ONLY option to a view to restrict DML operations
Learning Indicator: IS_16.12.13	Use Internet resources to identify future trends, innovations, and directions in the future of computing
Learning Indicator: IS_16.12.14	Create and execute a query that removes a view
Learning Indicator: IS_16.12.15	Create and execute a query to create an inline view
Learning Indicator: IS_16.12.16	Create and execute a top-n-analysis query

IS_16.13 Demonstrate ability to use Database Objects.

Learning Indicator: IS_16.13.1	Name and define five database objects
Learning Indicator: IS_16.13.2	List at least three useful characteristics of a sequence
Learning Indicator: IS_16.13.3	Construct and execute a sequence that correctly includes INCREMENT BY, START WITH, MAXVALUE and NOMAXVALUE, MINVALUE and NOMINVALUE, CYCLE and NOCYCLE, CACHE and NOCACHE
Learning Indicator: IS_16.13.4	Provide evidence to support the assigned topic: "How is the use of sequences related to the definition of the unique identifier (UID) as used in data modeling?"
Learning Indicator: IS_16.13.5	Provide evidence to support the assigned topic: "What possible advantage could there be to using a consistent data type and length for UIDs?"
Learning Indicator: IS_16.13.6	Query the data dictionary using USER_SEQUENCES to confirm a sequence definition
Learning Indicator: IS_16.13.7	Apply the rules for using NEXTVAL to generate sequential numbers for use in a table
Learning Indicator: IS_16.13.8	List the advantages of caching sequence values
Learning Indicator: IS_16.13.9	Name three reasons why gaps can occur in a sequence
Learning Indicator: IS_16.13.10	Define an index and its use as a schema object
Learning Indicator: IS_16.13.11	Define ROWID and its use in locating information in a database
Learning Indicator: IS_16.13.12	Name the conditions that cause an index to be created automatically
Learning Indicator: IS_16.13.13	Create and execute a CREATE INDEX statement
Learning Indicator: IS_16.13.14	List four conditions that warrant creating an index; list five conditions that do not warrant creating an index
Learning Indicator: IS_16.13.15	Query the data dictionary to confirm the existence of an index
Learning Indicator: IS_16.13.16	Construct and execute a function-based index that allows case-insensitive searches
Learning Indicator: IS_16.13.17	Construct and execute a DROP INDEX statement
Learning Indicator: IS_16.13.18	Provide evidence to support the assigned topic: "Discuss the advantages of indexes for queries and the potential disadvantages for DML"
Learning Indicator: IS_16.13.19	Construct a synonym and use the data dictionary to confirm its definition

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IS_16.14 Explain Basic Database Systems and the need for Database Security.

Learning Indicator: IS_16.14.1	Construct and execute a GRANT ON TO [WITH GRANT OPTION] statement to assign privileges to objects in their schema to other users and/or PUBLIC
Learning Indicator: IS_16.14.2	Construct and execute a statement to REVOKE object privileges from other users and/or from PUBLIC
Learning Indicator: IS_16.14.3	Compare the difference between object privileges and system privileges
Learning Indicator: IS_16.14.4	Query the data dictionary to confirm privileges granted
Learning Indicator: IS_16.14.5	Explain the purpose of a database link
Learning Indicator: IS_16.14.6	Apply SQL concepts to create a functional database appropriate for a small business
Learning Indicator: IS_16.14.7	Create table components and layouts using a wizard
Learning Indicator: IS_16.14.8	Create the application's pages, page style, and popup list of values (LOVs) using a wizard
Learning Indicator: IS_16.14.9	Create input forms using a wizard
Learning Indicator: IS_16.14.10	Input data into the CUSTOMERS, SUBJECTS, PUBLISHERS, and ITEM_TYPES tables using a wizard
Learning Indicator: IS_16.14.11	Define the terms COMMIT, ROLLBACK, and SAVEPOINT as they relate to data transactions
Learning Indicator: IS_16.14.12	List three advantages of the COMMIT, ROLLBACK, and SAVEPOINT statements
Learning Indicator: IS_16.14.13	Explain why it is important, from a business perspective, to be able to control the flow of transaction processing
Learning Indicator: IS_16.14.14	Explain the difference between system security and data security as it relates to a database
Learning Indicator: IS_16.14.15	Provide evidence to support the topic, "Why is it important, from a business perspective, to be able to set up user accounts with different types of access permissions?"
Learning Indicator: IS_16.14.16	List 5 system privileges and explain their functions
Learning Indicator: IS_16.14.17	Write a statement to create a user
Learning Indicator: IS_16.14.18	Write a statement to GRANT privileges such as CREATE SESSION, CREATE TABLE, CREATE SEQUENCE, CREATE VIEW, and CREATE PROCEDURE
Learning Indicator: IS_16.14.19	Define and explain the advantages of a role
Learning Indicator: IS_16.14.20	Define a database link and explain the object privileges that apply with a remote database