

Idaho Information Systems Standards and Learning Indicators

Information Systems IS_1: Demonstrate Knowledge of the Foundations of Information Systems

IS_1.1 Identify and use various input technologies that include keyboarding, voice recognition, handwriting recognition, optical character recognition, and other forms of emerging input technologies.

Lrn_Ind_ID	Learning Indicator
IS_1.1.1	Develop proper input techniques for the keyboard and 10-key pad
IS_1.1.2	Build keyboarding skills, including speed and accuracy
IS_1.1.3	Master touch-keying for letter, punctuation, numeric, and symbol keys
IS_1.1.4	Apply proofreading skills
IS_1.1.5	Select and apply various appropriate input technologies such as image and text scanning, voice recognition, handwriting recognition, digital cameras, student response systems, touch screen mouse or stylus and tablet forms of input
IS_1.1.6	Develop proper input techniques for emerging technologies to optimize performance in composing documents
IS_1.1.7	Describe ergonomic issues and recognize how to prevent repetitive stress injuries related to input technologies
IS_1.1.8	Demonstrate proper safety techniques using input technologies (e.g., burning and copying media and DVD's)
IS_1.1.9	Organize and arrange workspace area

IS_1.2 Demonstrate a knowledge of computers and the ability to use them.

Lrn_Ind_ID	Learning Indicator
IS_1.2.1	Describe how to cold boot (start up) and warm boot (restart/reset) a computer. Explain the difference. Which should be attempted first?
IS_1.2.2	Identify (list) the basic components of your computer system and peripherals
IS_1.2.3	Define, explain or demonstrate written knowledge of the following components: Ports Modem, RAM, CPU, Mouse, File Server, Network (LAN & WAN), Serial Ports, Parallel Ports, Operating Systems, Files, Folders, Subfolders, Hard Drive, Storage Disks, CD-ROM, Zip Drives, LCD Displays
IS_1.2.4	List and describe the different types of printers available and their main differences

IS_1.3 Identify the need for applications of technology in business, industry, society and on a global scale.

Lrn_Ind_ID	Learning Indicator
IS_1.3.1	Demonstrate the ability to access information regarding applications of computers and technology in business, industry, society and on a global scale
IS_1.3.2	Cite uses of computer and technology in business, industry, society and on a global scale
IS_1.3.3	Create a brief list of business, industry, society and global references and sources where information about applications of computers and technology can be found

Information Systems IS_2: Demonstrate Knowledge of Industry Standard Software Applications

IS_2.1 Select and apply word processing software.

Lrn_Ind_ID	Learning Indicator
IS_2.1.1	Explain the purposes, functions, and common features of word processing software
IS_2.1.2	Explain the meaning of common word processing terminology
IS_2.1.3	Sequence and define steps of an information processing cycle
IS_2.1.4	Use word processing software to demonstrate file functions including creating, modifying, storing, retrieving, printing, and merging documents
IS_2.1.5	Demonstrate editing functions including cutting, pasting, importing and exporting text and graphics

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IS_2.1.6	Apply layout and insert functions including tabs, margins, hanging indents, word-wrap, columns, headers/footers, and tables
IS_2.1.7	Apply formatting functions including fonts, sizes, styles, and positioning
IS_2.1.8	Apply word processing functions including spell checking, thesaurus, grammar checking, and the help functions of the software
IS_2.1.9	Proofread and edit documents for accuracy and content, and for correct grammar, spelling, and punctuation
IS_2.1.10	Input, edit, store, and output letters, memorandums, tables, and reports
IS_2.1.11	Use an office operations manual

IS_2.2 Select and apply spreadsheet software.

Lrn_Ind_ID	Learning Indicator
IS_2.2.1	Explain the purposes, functions, and common features of spreadsheet software
IS_2.2.2	Explain the meaning of common spreadsheet terms
IS_2.2.3	Use spreadsheet software to demonstrate file functions including creating, saving, loading, printing, and merging documents
IS_2.2.4	Demonstrate editing functions including inserting, cutting, pasting, and importing of text into spreadsheets
IS_2.2.5	Apply formatting functions including fonts, styles, size, and formulas
IS_2.2.6	Apply layout functions including columns, rows, and sheets
IS_2.2.7	Demonstrate ability to apply tool functions including sorting, navigating, and searching
IS_2.2.8	Apply tools including spell checking, thesaurus, grammar checking, and the help functions of the software
IS_2.2.9	Design and enter common formulas that permit users to analyze spreadsheet data
IS_2.2.10	Test spreadsheet formulas and design for accuracy

IS_2.3 Select and apply database software.

Lrn_Ind_ID	Learning Indicator
IS_2.3.1	Explain the purposes, functions, and common features of database software
IS_2.3.2	Explain the meaning of common database terminology
IS_2.3.3	Identify the differences between integrated and dedicated software
IS_2.3.4	Use database software to demonstrate file functions including creating, saving, loading, printing, and merging documents
IS_2.3.5	Demonstrate editing functions including inserting and deleting records and fields
IS_2.3.6	Demonstrate ability to apply layout functions including creating fields, tags, and records
IS_2.3.7	Demonstrate ability to apply functions such as query, sorting, navigating, and retrieval of data
IS_2.3.8	Demonstrate ability to apply word processing tools including spell checking, thesaurus, and grammar checking
IS_2.3.9	Demonstrate ability to plan, create, modify, and print reports

IS_2.4 Select and use multimedia software to create media rich projects.

Lrn_Ind_ID	Learning Indicator
IS_2.4.1	Select and apply multimedia software appropriate for specific tasks
IS_2.4.2	Explore three emerging multimedia software programs and identify differences
IS_2.4.3	Create multimedia projects collaboratively
IS_2.4.4	Identify and select appropriate multimedia file formats and properties
IS_2.4.5	Create multimedia content and prepare it for delivery
IS_2.4.6	Configure multimedia delivery tools

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IS_2.5 Select and use industry- and subject-specific software.

Lrn_Ind_ID Learning Indicator

- IS_2.5.1 Identify and explain the various types and sources of subject-specific software for accounting, finance, production, human resources management, records management, and marketing
 - IS_2.5.2 Identify and explain the various types and sources of industry-specific software for the following industries: legal, health services, aerospace, and agricultural
 - IS_2.5.3 Select and use subject-specific and industry-specific software for tasks
 - IS_2.5.4 Use software as tools to solve organization problems
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Information Systems IS_3: Demonstrate Knowledge of Common Applications of Information Systems

IS_3.1 Identify, select, evaluate, and use application software.

Lrn_Ind_ID Learning Indicator

- IS_3.1.1 Identify the types of application software and explain their purpose or use
 - IS_3.1.2 Select application software types appropriate for specific tasks
 - IS_3.1.3 Describe emerging application software
 - IS_3.1.4 Use reference materials, such as on-line help, vendor bulletin boards, tutorials, and manuals available for application software
 - IS_3.1.5 Identify, select, and apply the features of software products, such as galleries, templates, and macros
 - IS_3.1.6 Evaluate application software products in terms of their features
 - IS_3.1.7 Select application software products appropriate to various computer platforms
 - IS_3.1.8 Import and export text, data, and images between software programs
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IS_3.2 Install, upgrade, and customize application software.

Lrn_Ind_ID Learning Indicator

- IS_3.2.1 Store and maintain application software
 - IS_3.2.2 Install, upgrade, and customize application software
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IS_3.3 Diagnose and solve problems occurring from an application software's installation and use.

Lrn_Ind_ID Learning Indicator

- IS_3.3.1 Diagnose and solve application software problems
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Information Systems IS_4: Demonstrate Knowledge of File and Database Management Systems

IS_4.1 Enter, sort, retrieve, and evaluate data from databases.

Lrn_Ind_ID Learning Indicator

- IS_4.1.1 Explain the nature and interrelationships of fields, records, files, and databases
 - IS_4.1.2 Sequence and define steps of an information processing cycle
 - IS_4.1.3 Describe search strategies and use them to solve common information problems
 - IS_4.1.4 Sort and retrieve data from files and databases
 - IS_4.1.5 Locate requested information on a computer printout
 - IS_4.1.6 Edit and verify printout information
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IS_4.2 Plan, develop, and modify file specifications and database schema.

Lrn_Ind_ID Learning Indicator

- IS_4.2.1 Plan and develop record specifications
 - IS_4.2.2 Use database application development tools to create information systems to solve organization problems
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IS_4.2.3	Identify and describe electronic and microform storage media
IS_4.2.4	Evaluate and select electronic and microform storage media appropriate to tasks
IS_4.2.5	Explain, compare, and contrast sequential, direct, and indexed sequential file structures
IS_4.2.6	Identify and select file structures appropriate to specific applications
IS_4.2.7	Modify record structures

Information Systems IS_5: Demonstrate Knowledge of Communications Systems and Networking

IS_5.1 Use, select, and evaluate communications and networking systems software and hardware to include hubs, switches and routers.

Lrn_Ind_ID	Learning Indicator
IS_5.1.1	Identify the types of communications hardware and explain their functions and use
IS_5.1.2	Identify the types of communications software and explain their functions and use
IS_5.1.3	Select communications hardware appropriate for specific tasks
IS_5.1.4	Select communications software appropriate for specific tasks
IS_5.1.5	Demonstrate knowledge of basic telecommunication concepts in relation to technology, applications, and system components
IS_5.1.6	Perform computer activities in communications with modems
IS_5.1.7	Identify and describe the different components of the telecommunications industry
IS_5.1.8	Identify and explain various types of on-line services (e.g., Internet, Intranet, and Extranet)
IS_5.1.9	Access, navigate, and use on-line services (e.g., Internet, Intranet, and Extranet)
IS_5.1.10	Send and receive e-mail messages, voice messages, and faxes
IS_5.1.11	Identify the basic components of any communications system
IS_5.1.12	Transfer files between varying types of computers, both local and remote
IS_5.1.13	Communicate between varying computer platforms

IS_5.2 Design, implement, and repair communications and networking systems using cable, fiber optics and/or wireless communications.

Lrn_Ind_ID	Learning Indicator
IS_5.1.14	Identify the types of networks and their features and use
IS_5.1.15	Discuss impact of local and wide area networks on delivery of information
IS_5.1.16	Provide comparisons of topologies and protocols available for local area networks
IS_5.1.17	Install local area network hardware
IS_5.1.18	Generate and maintain the operating system
IS_5.1.19	Introduce bridges and gateways
IS_5.1.20	Select communications software appropriate for specific hardware
IS_5.1.21	Evaluate communications software products in terms of their features
IS_5.1.22	Install and customize communications software
IS_5.1.23	Identify, evaluate, and select telephone systems for various organizational needs
IS_5.1.24	Identify business concerns such as procurement, accounting, security, and other concerns

Information Systems IS_6: Demonstrate Knowledge of Adaptations for Students with Special Needs

IS_6.1 Select and apply information for special needs students.

Lrn_Ind_ID	Learning Indicator
IS_6.1.1	Demonstrate knowledge of sources of information regarding adaptation of instruction for students with special needs

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IS_6.1.2	Demonstrate knowledge of basic adaptive devices for students with special needs including alternate display and input technologies
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IS_6.2 Select and apply information systems across the curriculum.

Lrn_Ind_ID	Learning Indicator
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IS_6.2.1	Demonstrate how information systems can support learning in all curriculum areas
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IS_6.2.2	Select and apply information systems hardware and software appropriate to accomplish tasks across the curriculum
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Information Systems IS_7: Demonstrate Knowledge of Information Systems Ethical Issues

IS_7.1 Establish and use a personal code of ethics for information systems use and management.

Lrn_Ind_ID	Learning Indicator
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IS_7.1.1	Identify and explain property, privacy, access, and accuracy issues pertaining to information systems
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IS_7.1.2	Analyze various information systems to distinguish ethical issues and problems
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IS_7.1.3	Develop a code of ethics for information systems
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IS_7.1.4	Apply ethical considerations to the operation and management of information systems common to organizations
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IS_7.1.5	Demonstrate knowledge of laws and statutes relative to use of technology including copyright, equal access, fair use, educational opportunity, and least restrictive learning environment
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IS_7.1.6	Discuss ethical and human issues relative to the use of technology in schools
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Information Systems IS_8: Demonstrate Knowledge of the Social and Economic Impact of Information Systems

IS_8.1 Demonstrate a knowledge of the social and economic impact of information systems.

Lrn_Ind_ID	Learning Indicator
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IS_8.1.1	Describe how information systems have changed the breadth and level of worker responsibilities
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IS_8.1.2	Describe how information systems have changed social norms, including worker/manager protocols, and attitudes toward work, family, school, and other cultures
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IS_8.1.3	Describe how information systems have fostered greater interdependence among workers, organizations, and nations
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IS_8.1.4	Describe how new developments in information systems affect supply/demand dimensions in the job market
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IS_8.1.5	Describe how information systems have changed organizational structure
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IS_8.1.6	Describe how information systems have transformed business processes and relationships
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IS_8.1.7	Describe how information systems have changed the manner in which training is offered and implemented
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IS_8.1.8	Explain how information systems have contributed to worker productivity
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Information Systems IS_9: Demonstrate Knowledge of Computer Architecture

IS_9.1 Describe current and emerging computer architecture; configure, install, and upgrade hardware systems; and diagnose and repair hardware problems.

Lrn_Ind_ID	Learning Indicator
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IS_9.1.1	Identify hardware components such as hubs, switches and routers
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IS_9.1.2	Explain the purpose, operation, and care of hardware components
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IS_9.1.3	Identify examples of emerging hardware technology
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IS_9.1.4	Diagnose hardware problems
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IS_9.1.5	Illustrate various configurations of hardware components
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IS_9.1.6	Describe ergonomic principles in the configuration of computer workstations
IS_9.1.7	Remove, upgrade, and install computer hardware
IS_9.1.8	Repair computer hardware problems

Information Systems IS_10: Demonstrate Knowledge of Operating Systems, Environments, and Utilities

IS_10.1 Identify, select, evaluate, use, install, upgrade, customize, diagnose and solve problems with various types of operating systems, environments, and utilities.

Lrn_Ind_ID	Learning Indicator
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IS_10.1.1	Describe various types of operating systems, environments, and utilities
IS_10.1.2	Describe emerging operating systems technology
IS_10.1.3	Perform "start-up" procedures on a computer system
IS_10.1.4	Use operating system commands
IS_10.1.5	Demonstrate a knowledge of operating systems/languages
IS_10.1.6	Prepare flow charts for business applications
IS_10.1.7	Import, export, and merge data stored in different formats
IS_10.1.8	Compare and contrast the functions and features of different operating systems, environments, and utilities
IS_10.1.9	Select operating systems, environments, and utilities appropriate to specific hardware and software
IS_10.1.10	Organize and maintain directories and files using various operating systems
IS_10.1.12	Diagnose and repair installation and operational problems of operating systems, environments, and utilities
IS_10.1.11	Install operating systems, environments, and utilities

Information Systems IS_11: Demonstrate Knowledge of Information Systems Planning, Acquisition, Analysis and Design

IS_11.1 Plan the selection and acquisition of information systems; analyze and design information systems using appropriate development tools.

Lrn_Ind_ID	Learning Indicator
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IS_11.1.1	Identify sources for information systems hardware and software
IS_11.1.2	Develop design specifications for reports, screens, and data stores
IS_11.1.3	Complete appropriate documentation for information systems
IS_11.1.4	Identify and describe various structured analysis and design tools
IS_11.1.5	Using structured systems analysis tools, analyze the current system
IS_11.1.6	Using structured systems analysis tools, define the system requirements
IS_11.1.7	Design information systems interfaces appropriate to end-user needs
IS_11.1.8	Develop a training plan

Information Systems IS_12: Demonstrate Knowledge of Programming

IS_12.1 Demonstrate knowledge of computer history.

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

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IS_12.1.6 Discuss the fundamental concepts of object-oriented programming

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

Lrn_Ind_ID Learning Indicator

IS_12.2.1 Describe the structure of a simple program

IS_12.2.2 Write a simple program - hello world

IS_12.2.3 Edit, compile, and run a program

IS_12.2.4 Format a program to give a pleasing, consistent appearance

IS_12.2.5 Locate compile-time errors

IS_12.2.6 Write a simple graphics program

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

Lrn_Ind_ID Learning Indicator

IS_12.3.1 Construct and use numeric and string literals

IS_12.3.3 Create arithmetic expressions

IS_12.3.2 Name and use variables constraints

IS_12.3.4 Know the precedence of different arithmetic operators

IS_12.3.5 Concatenate two strings or a number and a string

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

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

IS_12.3.8 Insert output statements to debug a program

IS_12.3.9 Differentiate between Cartesian coordinates and screen coordinates

IS_12.3.10 Work with color and text properties

IS_12.4 Demonstrate ability to use basic control statements.

Lrn_Ind_ID Learning Indicator

IS_12.4.1 Use the increment and decrement operators

IS_12.4.2 Use standard math methods

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

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

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

IS_12.4.6 Detect and correct common errors involving loops

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

Lrn_Ind_ID Learning Indicator

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

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

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

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

IS_12.5.5 Describe how parameters transmit data to methods

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

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

IS_12.6 Demonstrate ability to use Advanced Control Statements.

Lrn_Ind_ID Learning Indicator

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

IS_12.6.2 Construct truth tables for Boolean expressions

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

IS_12.6.4 Test if statements in a comprehensive manner

IS_12.6.5 Construct nested loops

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

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

IS_12.7 Demonstrate ability to use User Interfaces.

Lrn_Ind_ID Learning Indicator

IS_12.7.1 Construct a query-driven terminal interface

IS_12.7.2 Construct a menu driven terminal interface

IS_12.7.3 Construct a graphical user interface

IS_12.7.4 Format text, including numbers, for output

IS_12.7.5 Handle number format exceptions during input

IS_12.8 Demonstrate ability to use Applets.

Lrn_Ind_ID Learning Indicator

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

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.

Lrn_Ind_ID Learning Indicator

IS_12.9.1 Write programs that handle collections of similar items

IS_12.9.2 Declare array variables and instantiate array objects

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

IS_12.9.4 Write methods to manipulate arrays

IS_12.9.5 Create parallel arrays and two-dimensional arrays

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

Lrn_Ind_ID Learning Indicator

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

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

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

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

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

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

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.

Lrn_Ind_ID Learning Indicator

IS_12.11.1 Use string methods appropriately

IS_12.11.2 Write a method for searching an array

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

IS_12.11.4 Write a method to sort an array

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

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

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

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IS_12.12	Demonstrate ability to use Recursion, Searching, and Sorting.
Lrn_Ind_ID	Learning Indicator
IS_12.12.1	Design and implement a recursive method to solve a problem
IS_12.12.2	Differentiate between recursive and interactive solutions of a problem
IS_12.12.3	Check and test a recursive method for correctness.
IS_12.12.4	Explain how a computer executes a recursive method
IS_12.12.5	Perform a simple complexity analysis an algorithm using big-O notation
IS_12.12.6	Recognize some typical orders of complexity
IS_12.12.7	Interpret the behavior of a complex sort algorithm such as quicksort

IS_12.13	Demonstrate ability to use Object-Oriented Analysis & Design.
Lrn_Ind_ID	Learning Indicator
IS_12.13.1	Describe the general role of analysis and design in the software development process
IS_12.13.2	Given a problem's description, pick out the classes and their attributes
IS_12.13.3	Describe the role of a graphical notation such as Unified Modeling Language (UML) in object-oriented analysis and design
IS_12.13.4	Interpret simple class diagrams and their basic features
IS_12.13.5	Differentiate between aggregation, inheritance, and other relationships among classes
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.
Lrn_Ind_ID	Learning Indicator
IS_12.14.1	Distinguish fundamental categories of collections, such as linear, hierarchical, graph, and unordered
IS_12.14.2	Describe the basic features of lists and their applications
IS_12.14.3	Use the List interface and the major list implementation classes
IS_12.14.4	Recognize the difference between index-based operations and content-based operations on a list
IS_12.14.5	Describe the restrictions on the use of list operations

IS_12.15	Demonstrate ability to use Stacks and Queues.
Lrn_Ind_ID	Learning Indicator
IS_12.15.1	Interpret the behavior of a stack and recognize applications in which a stack would be useful
IS_12.15.2	Interpret the behavior of a queue and recognize applications in which a queue would be useful
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.
Lrn_Ind_ID	Learning Indicator
IS_12.16.1	Identify the basic features of sets and their applications
IS_12.16.2	Use the set interface and the set implementation class
IS_12.16.3	Differentiate between a set and a sorted set
IS_12.16.4	Recognize the basic features of maps and their applications
IS_12.16.5	Use the map interface and the map implementation class
IS_12.16.6	Differentiate between a map and a sorted map
IS_12.16.7	Describe the general features of collections
IS_12.16.8	Use the collection interface

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IS_12.17 Demonstrate ability to Implement Lists.

Lrn_Ind_ID Learning Indicator

- IS_12.17.1 Use an array to implement and indexed list
 - IS_12.17.2 Use a singly linked structure to implement an indexed list
 - IS_12.17.3 Use an array to implement a positional list
 - IS_12.17.4 Use a doubly linked structure to implement a positional list
 - 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.

Lrn_Ind_ID Learning Indicator

- IS_12.18.1 Explain why a list implementation of sets and maps is simple but inefficient
 - IS_12.18.2 Develop hash functions to implement sets and maps
 - IS_12.18.3 Utilize different strategies for resolving collisions during hashing.
 - IS_12.18.4 Describe why a hashing implementation of sets and maps can be very efficient
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IS_12.19 Demonstrate ability to Implement Trees & Priority Queues.

Lrn_Ind_ID Learning Indicator

- IS_12.19.1 Use the appropriate terminology to describe trees
 - IS_12.19.2 Distinguish different types of hierarchical collections, such as general trees, binary trees, binary search trees, and heaps
 - IS_12.19.3 Describe the basic tree traversals
 - IS_12.19.4 Use binary search trees to implement sorted sets and sorted maps
 - IS_12.19.5 Use heaps to implement priority queues
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Information Systems IS_13: Demonstrate Knowledge of Communications Systems and Networking

IS_13.1 Design and implement security plans and procedures for information systems.

Lrn_Ind_ID Learning Indicator

- IS_13.1.1 Identify risks to information systems facilities, data, communications systems, and applications
 - IS_13.1.2 Identify and select controls for information systems facilities, data, communications, and applications appropriate to specific risks
 - IS_13.1.3 Apply procedures used to restart and recover from situations such as system failure and viral infection
 - IS_13.1.4 Identify federal and state legislation pertaining to computer crime, fraud, and abuse
 - IS_13.1.5 Design and implement a security plan for an information system
 - IS_13.1.6 Develop and implement data retention and destruction schedules
 - IS_13.1.7 Develop and implement disaster prevention and recovery procedures
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Information Systems IS_15: Demonstrate Knowledge of Database Design

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

Lrn_Ind_ID Learning Indicator

- IS_15.1.1 Identify and examine data
- IS_15.1.2 List reasons for significance of data and tracing and sorting
- IS_15.1.3 Measure importance of describing information requirements
- IS_15.1.4 Distinguish between a conceptual model and physical implementation
- IS_15.1.5 Define and give an example of an entity
- IS_15.1.6 Distinguish between an entity and an instance of an entity

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IS_15.1.7	Identify aspects of a business about which data must be known
IS_15.1.8	Name and describe attributes for a given entity
IS_15.1.9	Distinguish between an attribute and its value
IS_15.1.10	Select and justify a unique identifier (UID) for an entity
IS_15.1.11	Identify an entity relationship diagram (ERD)
IS_15.1.12	List the major types of databases
IS_15.1.13	Interpret and describe relationship optionality
IS_15.1.14	Interpret and describe relationship cardinality
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).

Lrn_Ind_ID Learning Indicator

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

IS_15.3 Demonstrate knowledge of Entity Relationship details.

Lrn_Ind_ID Learning Indicator

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

Lrn_Ind_ID Learning Indicator

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

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IS_15.4.11 Distinguish between the use of an arc and a subtype in the data model

IS_15.4.12 Defend and give an example of a hierarchical relationship

IS_15.4.13 Identify business examples of recursive relationships

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

Lrn_Ind_ID 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

IS_15.5.2 Solve the problem of keeping characteristics of a date by constructing a model that uses DAY as an entity

IS_15.5.3 Identify at least three time-related constraints that can result from a time sensitive model

IS_15.5.4 Define and give an example of conditional nontransferability in a time-constraint

IS_15.5.5 Solve the business requirement of tracking changes in price or values by constructing a model that uses a historical entity

IS_15.5.6 Describe the meaning of journaling/logging

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.

Lrn_Ind_ID Learning Indicator

IS_15.6.1 Apply the rule of basic mapping to transform n entity into a table

IS_15.6.2 Apply the rule of relationship mapping to correctly transform one-to-many and barred relationships

IS_15.6.3 Apply the rule of relationship mapping to correctly transform many-to-many relationships

IS_15.6.4 Apply the rule of relationship mapping to correctly transform one-to-one relationships

Information Systems IS_14: Demonstrate Knowledge of Information Systems Careers

IS_14.1 Describe positions and career paths in information systems.

Lrn_Ind_ID Learning Indicator

IS_14.1.1 Identify positions and career paths in the field of information systems

IS_14.1.2 Identify common tasks performed by information systems workers

IS_14.1.3 Describe education, experience, skills, and personal requirements for careers in information systems

IS_14.1.4 Recognize the impact of technological change on information systems positions and the resulting need for lifelong learning and retraining

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.

Lrn_Ind_ID Learning Indicator

IS_16.1.1 Create a basic SELECT statement

IS_16.1.2 Use the correct syntax to display all rows in a table

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

IS_16.1.4 Formulate queries using correct operator precedence

IS_16.1.5 Define a null Value

IS_16.1.6 Demonstrate the effect null values create in arithmetic expressions

IS_16.1.7 Construct a query using a column alias

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IS_16.2 Demonstrate ability to restrict and sort data.	
Lrn_Ind_ID	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
IS_16.2.2	Enter literal values of the type character, number, or date into a SELECT statement
IS_16.2.3	Define and use DISTINCT to eliminate duplication rows
IS_16.2.4	Display the structure of a table using DESCRIBE or DESC
IS_16.2.5	Apply SQL syntax to restrict the rows returned from a query
IS_16.2.6	Demonstrate application of the WHERE clause syntax
IS_16.2.7	Explain why it is important, from a business perspective, to be able to easily limit data retrieved from a table
IS_16.2.8	Construct and produce output using a SQL query containing character strings and date values
IS_16.2.9	Apply the proper comparison operator to return a desired result
IS_16.2.10	Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result
IS_16.2.11	Distinguish between zero and the value of NULL as unavailable, unassigned, unknown, or inapplicable
IS_16.2.12	Explain the use of comparison conditions and NULL

IS_16.3 Demonstrate knowledge and use of Logical Comparisons & sorting.	
Lrn_Ind_ID	Learning Indicator
IS_16.3.1	Evaluate logical comparisons to restrict the rows returned based on two or more conditions
IS_16.3.2	Apply the rules of precedence to determine the order in which expressions are evaluated and calculated
IS_16.3.3	Construct a query to sort a results set in ascending or descending order
IS_16.3.4	State the order in which expressions are evaluated and calculated based on the rules of precedence
IS_16.3.5	Construct a query to order a results set using a column alias
IS_16.3.6	Construct a query to order a results set for single or multiple columns
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.	
Lrn_Ind_ID	Learning Indicator
IS_16.4.1	Differentiate between single-row functions and multi-row functions and the result returned by each
IS_16.4.2	Differentiate between operations of single-row functions and multiple-row functions
IS_16.4.3	Select and apply single-row functions that perform case conversion and/or character manipulation
IS_16.4.4	Select and apply character-manipulation functions CONCAT, SUBSTR, LENGTH, INSTR, LPAD, RPAD, TRIM, and REPLACE in a SQL query
IS_16.4.5	Select and apply the single-row number functions ROUND, TRUNC, and MOD in a SQL query
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
IS_16.4.7	State the implications for business when applying TRUNC and ROUND to numeric values
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
IS_16.4.9	Demonstrate proper use of the arithmetic operators with dates
IS_16.4.10	Demonstrate the use of SYSDATE and date functions
IS_16.4.11	State the implications for world businesses to be able to easily manipulate data stored in date format
IS_16.4.12	Give an example of an explicit data-type conversion and an implicit data-type conversion
IS_16.4.13	Explain why it is important, from a business perspective, for a language to have built-in data-conversion capabilities

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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
IS_16.4.15	Apply the appropriate date and/or character format model to produce a desired output
IS_16.4.16	Explain and apply the use of YYYY and RRRR to return the correct year as stored in the database
IS_16.4.17	Demonstrate and explain the evaluation of a nested function
IS_16.4.18	List at least four general functions that work with any data type and relate to handling null values
IS_16.4.19	Explain the use of the COALESCE and the NVL functions
IS_16.4.20	Explain the use of general functions to deal with null values in data
IS_16.4.21	Construct and execute a SQL query that correctly applies NVL, NVL2, NULLIF, and COALESCE single-row functions
IS_16.4.22	Compare and contrast the DECODE and CASE functions
IS_16.4.23	Construct and execute a SQL query that correctly uses the DECODE and CASE functions
IS_16.4.24	Construct and execute two methods for implementing IF-THEN-ELSE conditional logic
IS_16.4.25	Demonstrate 70% mastery for Database Programming Quiz 1
IS_16.4.26	Describe the purpose of join conditions
IS_16.4.27	Construct and execute a SELECT statement that results in a Cartesian product
IS_16.4.28	Construct and execute SELECT statements to access data from more than one table using an equijoin
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.

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

Lrn_Ind_ID	Learning Indicator
IS_16.6.1	Group Functions, COUNT, DISTINCT, and NVL
IS_16.6.2	Define and give an example of the seven group functions: AVG, COUNT, MAX, MIN, STDDEV, SUM, VARIANCE
IS_16.6.3	Construct and execute a SQL query using SELECT, FROM, WHERE, GROUP BY, ORDER BY syntax using group functions

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IS_16.6.4	Construct and execute group functions that operate only with numeric data types
IS_16.6.5	Construct and execute group functions that operate only with numeric data types
IS_16.6.6	Construct and execute group functions that operate to produce a single value
IS_16.6.7	Compare and contrast the result set obtained from single-row functions versus group functions
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.

Lrn_Ind_ID	Learning Indicator
IS_16.7.1	Construct and execute a SQL query applying GROUP BY
IS_16.7.2	Construct and execute a SQL query applying HAVING
IS_16.7.3	State the purpose of the GROUP BY clause for aggregate functions
IS_16.7.4	State the purpose of the HAVING clause for aggregate functions
IS_16.7.5	Demonstrate 70% mastery for Database Programming Quiz 3
IS_16.7.6	Define and explain the function of subqueries for retrieving data
IS_16.7.7	Construct and execute a single-row subquery in the WHERE clause
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?
IS_16.7.9	Construct and execute a single-row subquery in the WHERE clause or HAVING clause
IS_16.7.10	Construct and execute a SELECT statement using more than one subquery
IS_16.7.11	Construct and execute a SELECT statement using a group function in the subquery
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.

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

Lrn_Ind_ID	Learning Indicator
IS_16.9.1	Construct and execute a MERGE statement
IS_16.9.2	List and provide an example of each of the number, character, and date data types
IS_16.9.3	Create a table applying the appropriate data type for each column
IS_16.9.4	List and provide an example of the each of the number, character, and date data types
IS_16.9.5	Create a table applying the appropriate data type for each column
IS_16.9.6	Create a table incorporating TIMESTAMP, INTERVAL YEAR TO MONTH, and INTERVAL DAY TO SECOND data types to columns.

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IS_16.9.7 Provide evidence to support the assigned topic "How might an organization use time stamps and time zones in business situations?"

IS_16.9.8 Articulate the changing nature of work and its associated educational requirements

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

Lrn_Ind_ID 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

IS_16.10.2 Explain why it is important to be able to modify a table

IS_16.10.3 Construct a query and execute the ALTER TABLE commands ADD, MODIFY, and DROP

IS_16.10.4 Explain the rationale for using TRUNCATE vs. DELETE for tables

IS_16.10.5 Add a comment to a table using the COMMENT ON TABLE command

IS_16.10.6 Name the changes that can and cannot be made to modify a column

IS_16.10.7 List the guidelines for dropping a column when constraints are present

IS_16.10.8 Explain when and why the SET UNUSED statement is advantageous

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.

Lrn_Ind_ID Learning Indicator

IS_16.11.1 Define the term "constraint" as it relates to data integrity

IS_16.11.2 Define and give an example of a NOT NULL and a UNIQUE constraint

IS_16.11.3 Name two reasons why constraints are incorporated into table definitions

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?"

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

IS_16.11.6 Define and give an example of a PRIMARY KEY, FOREIGN KEY, and CHECK constraint

IS_16.11.7 Explain the purpose of defining PRIMARY KEY, FOREIGN KEY, and CHECK constraints

IS_16.11.8 Demonstrate the creation of constraints at the column level and table level in a CREATE TABLE statement

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

IS_16.11.10 Query the data dictionary for USER_CONSTRAINTS and interpret the information returned

IS_16.11.11 Contrast constraint checking versus constraint management

IS_16.11.12 List three different functions that the ALTER statement can perform on constraints

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?"

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

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.

Lrn_Ind_ID Learning Indicator

IS_16.12.1 List three uses for views from the standpoint of a database administrator

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

IS_16.12.3 Create a view with and without column aliases in the subquery using a single base table

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IS_16.12.4	Create a complex view that contains group functions to display values from two tables
IS_16.12.5	Retrieve data from a view
IS_16.12.6	Write and execute a query that modifies a view
IS_16.12.7	Evaluate a business problem to create a new view and write the code to resolve the problem
IS_16.12.8	Write and execute a query that performs DML operations on a simple view
IS_16.12.9	Name the conditions that restrict modifying a view using DML operations
IS_16.12.10	Write and execute a query using the WITH CHECK OPTION clause
IS_16.12.11	Explain the use of WITH CHECK OPTION as it applies to integrity constraints and data validation
IS_16.12.12	Apply the WITH READ ONLY option to a view to restrict DML operations
IS_16.12.13	Use Internet resources to identify future trends, innovations, and directions in the future of computing
IS_16.12.14	Create and execute a query that removes a view
IS_16.12.15	Create and execute a query to create an inline view
IS_16.12.16	Create and execute a top-n-analysis query

IS_16.13 Demonstrate ability to use Database Objects.

Lrn_Ind_ID	Learning Indicator
IS_16.13.1	Name and define five database objects
IS_16.13.2	List at least three useful characteristics of a sequence
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
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?"
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?"
IS_16.13.6	Query the data dictionary using USER_SEQUENCES to confirm a sequence definition
IS_16.13.7	Apply the rules for using NEXTVAL to generate sequential numbers for use in a table
IS_16.13.8	List the advantages of caching sequence values
IS_16.13.9	Name three reasons why gaps can occur in a sequence
IS_16.13.10	Define an index and its use as a schema object
IS_16.13.11	Define ROWID and its use in locating information in a database
IS_16.13.12	Name the conditions that cause an index to be created automatically
IS_16.13.13	Create and execute a CREATE INDEX statement
IS_16.13.14	List four conditions that warrant creating an index; list five conditions that do not warrant creating an index
IS_16.13.15	Query the data dictionary to confirm the existence of an index
IS_16.13.16	Construct and execute a function-based index that allows case-insensitive searches
IS_16.13.17	Construct and execute a DROP INDEX statement
IS_16.13.18	Provide evidence to support the assigned topic: "Discuss the advantages of indexes for queries and the potential disadvantages for DML"
IS_16.13.19	Construct a synonym and use the data dictionary to confirm its definition

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

Lrn_Ind_ID	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
IS_16.14.2	Construct and execute a statement to REVOKE object privileges from other users and/or from PUBLIC
IS_16.14.3	Compare the difference between object privileges and system privileges

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IS_16.14.4	Query the data dictionary to confirm privileges granted
IS_16.14.5	Explain the purpose of a database link
IS_16.14.6	Apply SQL concepts to create a functional database appropriate for a small business
IS_16.14.7	Create table components and layouts using a wizard
IS_16.14.8	Create the application's pages, page style, and popup list of values (LOVs) using a wizard
IS_16.14.9	Create input forms using a wizard
IS_16.14.10	Input data into the CUSTOMERS, SUBJECTS, PUBLISHERS, and ITEM_TYPES tables using a wizard
IS_16.14.11	Define the terms COMMIT, ROLLBACK, and SAVEPOINT as they relate to data transactions
IS_16.14.12	List three advantages of the COMMIT, ROLLBACK, and SAVEPOINT statements
IS_16.14.13	Explain why it is important, from a business perspective, to be able to control the flow of transaction processing
IS_16.14.14	Explain the difference between system security and data security as it relates to a database
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?"
IS_16.14.16	List 5 system privileges and explain their functions
IS_16.14.17	Write a statement to create a user
IS_16.14.18	Write a statement to GRANT privileges such as CREATE SESSION, CREATE TABLE, CREATE SEQUENCE, CREATE VIEW, and CREATE PROCEDURE
IS_16.14.19	Define and explain the advantages of a role
IS_16.14.20	Define a database link and explain the object privileges that apply with a remote database

Information Systems IS_17: Demonstrate Knowledge of Advanced Concepts of Database PL/SQL Programming

IS_17.1 Demonstrate the ability to use PL/SQL.

Lrn_Ind_ID	Learning Indicator
IS_17.1.1	Describe PL/SQL
IS_17.1.2	Differentiate between SQL and PL/SQL
IS_17.1.3	Explain the need for PL/SQL

IS_17.2 Explain the benefits of PL/SQL.

Lrn_Ind_ID	Learning Indicator
IS_17.2.1	List and explain the benefits of PL/SQL
IS_17.2.2	List differences between PL/SQL and other programming languages.
IS_17.2.3	Give examples of how PL/SQL can be used in other Oracle products

IS_17.3 Create PL/SQL blocks.

Lrn_Ind_ID	Learning Indicator
IS_17.3.1	Describe the structure of a PL/SQL block
IS_17.3.2	Identify the different types of PL/SQL blocks
IS_17.3.3	Identify PL/SQL programming environments
IS_17.3.4	Create and execute an anonymous PL/SQL block
IS_17.3.5	Output messages in PL/SQL

IS_17.4 Create Variables in PL/SQL.

Lrn_Ind_ID	Learning Indicator
IS_17.4.1	List the uses of variables in PL/SQL
IS_17.4.2	Identify the syntax for variables in PL/SQL

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IS_17.4.3	Declare and initialize variables in PL/SQL
IS_17.4.4	Assign new values to variables in PL/SQL
IS_17.5	Demonstrate knowledge of other Lexical Units.
Lrn_Ind_ID	Learning Indicator
IS_17.5.1	List and define the different types of lexical units available in PL/SQL
IS_17.5.2	Describe identifiers and identify valid and invalid identifiers in PL/SQL.
IS_17.5.3	Describe and identify reserved words, delimiters, literals, and comments in PL/SQL
IS_17.6	Recognize and use Data Types.
Lrn_Ind_ID	Learning Indicator
IS_17.6.1	Define data type and explain why it is needed
IS_17.6.2	List and describe categories of data types
IS_17.6.3	Give examples of scalar, composite, and large object (LOB) data types
IS_17.7	Demonstrate ability to use Scalar Data Types.
Lrn_Ind_ID	Learning Indicator
IS_17.7.1	Declare and use scalar data types in PL/SQL
IS_17.7.2	Define guidelines for declaring and initializing PL/SQL variables
IS_17.7.3	Identify the benefits of anchoring data types with the %TYPE attribute
IS_17.8	Demonstrate ability to write PL/SQL Executable Statements.
Lrn_Ind_ID	Learning Indicator
IS_17.8.1	Construct accurate variable assignment statements in PL/SQL
IS_17.8.2	Construct accurate statements using built-in SQL functions in PL/SQL
IS_17.8.3	Differentiate between implicit and explicit conversions of data types
IS_17.8.4	Describe when implicit conversions of data types take place
IS_17.8.5	List drawbacks of implicit data type conversions
IS_17.8.6	Construct accurate statements using functions to explicitly convert data types
IS_17.8.7	Construct statements using operators in PL/SQL.
IS_17.9	Demonstrate ability to use Nested Blocks and Variable Scope.
Lrn_Ind_ID	Learning Indicator
IS_17.9.1	Describe the effect of exception propagation in nested blocks.
IS_17.9.2	Apprehend the scope and visibility of variables.
IS_17.9.3	Write nested blocks and qualify variables with labels
IS_17.9.4	Understand the scope of an exception
IS_17.9.5	Describe the effect of exception propagation in nested blocks.
IS_17.10	Demonstrate ability to follow Good Programming Practices.
Lrn_Ind_ID	Learning Indicator
IS_17.10.1	List examples of good programming practices
IS_17.10.2	Accurately insert comments into PL/SQL code
IS_17.10.3	Create PL/SQL code that follows formatting guidelines to produce readable code
IS_17.11	Demonstrate ability to retrieve Data in PL/SQL.
Lrn_Ind_ID	Learning Indicator
IS_17.11.1	Recognize the SQL statements that can be directly included in a PL/SQL executable block.

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IS_17.11.2	Construct and execute an INTO clause to hold the values returned by a single-row SQL SELECT statement.
IS_17.11.3	Construct statements to retrieve data that follow good practice guidelines.
IS_17.11.4	Construct statements that apply good practice guidelines for naming variables
IS_17.12	Demonstrate ability to manipulate Data in PL/SQL.
Lrn_Ind_ID	Learning Indicator
IS_17.12.1	Construct and execute PL/SQL statements that manipulate data with DML statements.
IS_17.12.2	Describe when to use implicit or explicit cursors in PL/SQL.
IS_17.12.3	Create PL/SQL code to use SQL implicit cursor attributes to evaluate cursor activity.
IS_17.13	Demonstrate ability to use Transaction Control Statements.
Lrn_Ind_ID	Learning Indicator
IS_17.13.1	Define a transaction and give an example
IS_17.13.2	Construct and execute a transaction control statement in PL/SQL.
IS_17.13.3	Conditional Control: IF Statements
IS_17.13.4	List the types of conditional control structures
IS_17.14	Demonstrate ability to construct and use an IF Statement.
Lrn_Ind_ID	Learning Indicator
IS_17.14.1	Construct and use an IF-THEN-ELSIF-ELSE statement.
IS_17.14.2	Create PL/SQL to handle the null condition in an IF statement.
IS_17.15	Demonstrate ability to use Case Conditional Control Statements.
Lrn_Ind_ID	Learning Indicator
IS_17.15.1	Construct and use CASE statements in PL/SQL.
IS_17.15.2	Construct and use CASE expressions in PL/SQL
IS_17.15.3	Include the correct syntax to handle null conditions in PL/SQL CASE statements.
IS_17.15.4	Include the correct syntax to handle Boolean conditions in PL/SQL IF and CASE statements.
IS_17.16	Demonstrate ability to use Basic Loops.
Lrn_Ind_ID	Learning Indicator
IS_17.16.1	Describe the need for LOOP statements in PL/SQL.
IS_17.16.2	Recognize different types of LOOP Statements.
IS_17.16.3	Create PL/SQL containing a basic loop and an EXIT statement with conditional termination
IS_17.16.4	Create PL/SQL containing a basic loop and an EXIT statement.
IS_17.17	Demonstrate ability to use While and For Loops.
Lrn_Ind_ID	Learning Indicator
IS_17.17.1	Construct and use the WHILE looping construct in PL/SQL
IS_17.17.2	Construct and use the FOR looping construct in PL/SQL.
IS_17.17.3	Describe when a WHILE loop is used in PL/SQL.
IS_17.17.4	Describe when a FOR loop is used in PL/SQL.
IS_17.18	Demonstrate ability to use Nested Loops.
Lrn_Ind_ID	Learning Indicator
IS_17.18.1	Construct and execute PL/SQL using nested loops
IS_17.18.2	Evaluate a nested loop construct and identify the exit point.

Idaho Information Systems Standards and Learning Indicators

IS_17.19 Demonstrate ability to use Explicit Cursors.

Lrn_Ind_ID Learning Indicator

- IS_17.19.1 Distinguish between an implicit and an explicit cursor.
 - IS_17.19.2 Describe why and when to use an explicit cursor in PL/SQL code.
 - IS_17.19.3 List two or more guidelines for declaring and controlling explicit cursors.
 - IS_17.19.4 Create PL/SQL code that successfully opens a cursor and fetches a piece of data into a variable.
 - IS_17.19.5 Use a simple loop to fetch multiple rows from a cursor
 - IS_17.19.6 Create PL/SQL code that successfully closes a cursor after fetching data into a variable.
-

IS_17.20 Demonstrate ability to use Explicit Cursor Attributes.

Lrn_Ind_ID Learning Indicator

- IS_17.20.1 Define a record structure using the %ROWTYPE attribute
 - IS_17.20.2 Create PL/SQL code to process the row of an active set using record types in cursors
 - IS_17.20.3 Retrieve information about the state of an explicit cursor using cursor attributes
-

IS_17.21 Demonstrate ability to use For Loops.

Lrn_Ind_ID Learning Indicator

- IS_17.21.1 List and explain the benefits of using cursor FOR loops.
 - IS_17.21.2 Create PL/SQL code to declare a cursor and manipulate it in a FOR loop.
 - IS_17.21.3 Create PL/SQL code containing a cursor FOR loop using a subquery
-

IS_17.22 Demonstrate ability to use Cursor Parameters.

Lrn_Ind_ID Learning Indicator

- IS_17.22.1 List the benefits of using parameters with cursors
 - IS_17.22.2 Create PL/SQL code to declare and manipulate a cursor with a parameter.
-

IS_17.23 Demonstrate ability to use cursors for update.

Lrn_Ind_ID Learning Indicator

- IS_17.23.1 Create PL/SQL code to lock rows before an update using the appropriate clause
 - IS_17.23.2 Explain the effect of using NOWAIT in an update cursor declaration.
 - IS_17.23.3 Create PL/SQL code to use the current row of the cursor in an UPDATE or DELETE statement
-

IS_17.24 Demonstrate ability to use multiple cursors.

Lrn_Ind_ID Learning Indicator

- IS_17.24.1 Explain the need for using multiple cursors to produce multilevel reports.
 - IS_17.24.2 Create PL/SQL code to declare and manipulate multiple cursors within nested loops
 - IS_17.24.3 Create PL/SQL code to declare and manipulate multiple cursors using parameters.
-

IS_17.25 Demonstrate ability of handling exceptions.

Lrn_Ind_ID Learning Indicator

- IS_17.25.1 Describe several advantages of including exception handling code in PL/SQL
 - IS_17.25.2 Describe the purpose of an EXCEPTION section in a PL/SQL block.
 - IS_17.25.3 Create PL/SQL code to include an EXCEPTION section.
 - IS_17.25.4 List several guidelines for exception handling.
-

Idaho Information Systems Standards and Learning Indicators

IS_17.26 Demonstrate knowledge of Trapping Oracle Server Exceptions.

Lrn_Ind_ID Learning Indicator

- IS_17.26.1 Describe and provide an example of an error defined by the Oracle server
 - IS_17.26.2 Describe and provide an example of an error defined by the PL/SQL programmer.
 - IS_17.26.3 Differentiate between errors that are handled implicitly and explicitly by the Oracle Server.
 - IS_17.26.4 Write PL/SQL code to trap a predefined Oracle Server error.
 - IS_17.26.5 Write PL/SQL code to trap a non-predefined Oracle Server error
 - IS_17.26.6 Write PL/SQL code to identify an exception by error code and by error message.
-

IS_17.27 Demonstrate knowledge of Trapping User-Defined Exceptions.

Lrn_Ind_ID Learning Indicator

- IS_17.27.1 Write PL/SQL code to name a user-defined exception.
 - IS_17.27.2 Write PL/SQL code to raise an exception
 - IS_17.27.3 Write PL/SQL code to handle a raised exception.
 - IS_17.27.4 Write PL/SQL code to use RAISE_APPLICATION_ERROR.
-

IS_17.28 Demonstrate knowledge of the Scope of Variables.

Lrn_Ind_ID Learning Indicator

- IS_17.28.1 Describe the rules for variable scope when a variable is nested in a block
 - IS_17.28.2 Recognize a variable scope issue when a variable is used in nested blocks
 - IS_17.28.3 Qualify a variable nested in a block with a label
 - IS_17.28.4 Describe the scope of an exception
 - IS_17.28.5 Describe the effect of exception propagation in nested blocks
-

IS_17.29 Demonstrate ability to create Procedures.

Lrn_Ind_ID Learning Indicator

- IS_17.29.1 Differentiate between anonymous blocks and subprograms
 - IS_17.29.2 Identify benefits of subprograms
 - IS_17.29.3 Define a stored procedure.
 - IS_17.29.4 Create a procedure.
 - IS_17.29.5 Describe how a stored procedure is invoked.
 - IS_17.29.6 List the development steps for creating a procedure.
-

IS_17.30 Demonstrate ability to use Parameters in Procedures.

Lrn_Ind_ID Learning Indicator

- IS_17.30.1 Describe how parameters contribute to a procedure.
 - IS_17.30.2 Define a parameter.
 - IS_17.30.3 Create a procedure using a parameter
 - IS_17.30.4 Invoke a procedure that has parameters.
 - IS_17.30.5 Differentiate between formal and actual parameters
-

IS_17.31 Demonstrate ability to use Parsing Parameters.

Lrn_Ind_ID Learning Indicator

- IS_17.31.1 List the types of parameter modes.
- IS_17.31.2 Create a procedure that passes parameters.
- IS_17.31.3 Identify three methods for passing parameters
- IS_17.31.4 Describe the DEFAULT option for parameters.

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IS_17.32	Demonstrate ability to Create Functions.
Lrn_Ind_ID	Learning Indicator
IS_17.32.1	Define a stored function
IS_17.32.2	Create a PL/SQL block containing a function
IS_17.32.3	List ways in which a function can be invoked.
IS_17.32.4	Create a PL/SQL block that invokes a function that has parameters.
IS_17.32.5	List the development steps for creating a function
IS_17.32.6	Describe the differences between procedures and functions.
IS_17.33	Demonstrate ability to use functions in SQL Statements.
Lrn_Ind_ID	Learning Indicator
IS_17.33.1	List the advantages of user-defined functions in SQL statements.
IS_17.33.2	List where user-defined functions can be called from within an SQL statement.
IS_17.33.3	Describe the restrictions on calling functions from SQL statements.
IS_17.34	Demonstrate ability to manage Procedures & Functions.
Lrn_Ind_ID	Learning Indicator
IS_17.34.1	Describe how exceptions are propagated.
IS_17.34.2	Remove a function and a procedure.
IS_17.34.3	Use data dictionary views to identify and manage stored programs.
IS_17.35	Demonstrate ability to use Invoker's Rights.
Lrn_Ind_ID	Learning Indicator
IS_17.35.1	Contrast invoker's rights with definer's rights.
IS_17.35.2	Create a procedure that uses invoker's rights.
IS_17.36	Demonstrate knowledge of Creating Packages.
Lrn_Ind_ID	Learning Indicator
IS_17.36.1	Describe the reasons for using a package.
IS_17.36.2	Describe the two components of a package: specification and body
IS_17.36.3	Create packages containing related variables, cursors, constants, exceptions, procedures, and functions
IS_17.36.4	Create a PL/SQL block that invokes a package construct
IS_17.37	Demonstrate knowledge of Managing Package Concepts.
Lrn_Ind_ID	Learning Indicator
IS_17.37.1	Explain the difference between public and private package constructs
IS_17.37.2	Designate a package construct as either public or private.
IS_17.37.3	Specify the appropriate syntax to drop packages
IS_17.37.4	Identify views in the data dictionary that manage packages
IS_17.37.5	Identify guidelines for using packages
IS_17.38	Demonstrate knowledge of Advanced Package Concepts.
Lrn_Ind_ID	Learning Indicator
IS_17.38.1	Write packages that use the overloading feature.
IS_17.38.2	Write packages that use forward declarations
IS_17.38.3	Explain the purpose of a package initialization block
IS_17.38.4	Identify restrictions on using packaged functions in SQL statements

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IS_17.39 Demonstrate knowledge of Persistent State of Package Variables.

Lrn_Ind_ID Learning Indicator

IS_17.39.1 Identify persistent states of package variables

IS_17.39.2 Control the persistent state of a package cursor

IS_17.40 Demonstrate knowledge of Using Oracle-Supplied Packages.

Lrn_Ind_ID Learning Indicator

IS_17.40.1 Describe two common uses for the DBMS_OUTPUT server-supplied package

IS_17.40.2 Recognize the correct syntax to specify messages for the DBMS_OUTPUT package

IS_17.40.3 Describe the purpose for the UTL_FILE server-supplied package

IS_17.40.4 Recall the exceptions used in conjunction with the UTL_FILE server-supplied package

IS_17.41 Demonstrate knowledge of Dynamic SQL.

Lrn_Ind_ID Learning Indicator

IS_17.41.1 Recall the stages through which all SQL statements pass

IS_17.41.2 Describe the reasons for using dynamic SQL to create a SQL statement.

IS_17.41.3 List four PL/SQL statements supporting Native Dynamic SQL

IS_17.41.4 Describe the benefits of Execute Immediate over DBMS_SQL for Dynamic SQL

IS_17.42 Demonstrate ability to use Triggers.

Lrn_Ind_ID Learning Indicator

IS_17.42.1 Describe database triggers and their uses

IS_17.42.2 Define a database trigger

IS_17.42.3 Recognize the difference between a database trigger and an application trigger

IS_17.42.4 List two or more guidelines for using triggers

IS_17.42.5 Compare and contrast database triggers and stored procedures

IS_17.42.6 Create a DML trigger

IS_17.42.7 List the DML trigger components

IS_17.42.8 Create a statement level trigger

IS_17.42.9 Describe the trigger firing sequence options

IS_17.42.10 Create a DML trigger that uses conditional predicates

IS_17.42.11 Create a row level trigger

IS_17.42.12 Create a row level trigger that uses OLD and NEW qualifiers

IS_17.42.13 Create an INSTEAD OF trigger

IS_17.42.14 Describe events that cause DDL and database event triggers to fire

IS_17.42.15 Create a trigger for a DDL statement

IS_17.42.16 Create a trigger for a database event

IS_17.42.17 Describe the functionality of the CALL statement

IS_17.42.18 Describe the cause of a mutating table

IS_17.42.19 View trigger information in the Data Dictionary

IS_17.42.20 Disable and enable a database trigger

IS_17.42.21 Remove a trigger from the database

IS_17.43 Demonstrate ability to use Large Object Data Types.

Lrn_Ind_ID Learning Indicator

IS_17.43.1 Compare and contrast LONG and LOB (large object) data types

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IS_17.43.2	Describe LOB data types and how they are used
IS_17.43.3	Differentiate between internal and external LOBs
IS_17.43.4	Create and maintain LOB data types
IS_17.43.5	Migrate data from LONG To LOB
IS_17.44	Demonstrate ability to use Files.
Lrn_Ind_ID	Learning Indicator
IS_17.44.1	Define BFILES and the BFILE column data type
IS_17.44.2	Create directory objects and view them in the Data Dictionary
IS_17.44.3	Manage and manipulate BFILES using BFILENAME and DBMS_LOB
IS_17.45	Demonstrate knowledge of User-Defined Records.
Lrn_Ind_ID	Learning Indicator
IS_17.45.1	Create and manipulate user-defined PL/SQL records
IS_17.46	Demonstrate ability to Index Tables of Records.
Lrn_Ind_ID	Learning Indicator
IS_17.46.1	Create an INDEX BY table
IS_17.46.2	Create an INDEX BY table of records
IS_17.46.3	Describe the difference between records, tables, and tables of records
IS_17.47	Demonstrate ability to use dependencies.
Lrn_Ind_ID	Learning Indicator
IS_17.47.1	Describe the implications of procedural dependencies
IS_17.47.2	Contrast dependent objects and referenced objects.
IS_17.47.3	View dependency information in the data dictionary
IS_17.47.4	Use the UTLDTREE script to create the objects required to display dependencies
IS_17.47.5	Use the IDEPTREE and DEPTREE views to display dependencies
IS_17.47.6	Describe when automatic recompilation occurs
IS_17.47.7	List how to minimize dependency failures

Information Systems IS_18: Demonstrate Knowledge of Web Design and Internet Fundamentals

IS_18.1	Demonstrate knowledge of internet fundamentals.
Lrn_Ind_ID	Learning Indicator
IS_18.1.1	Review the history of the Internet, the Web, and HTML
IS_18.1.2	Identify hardware components, software components and providers required to access the Internet
IS_18.1.3	Identify components of the Internet including servers, clients, routers, IP address, firewalls and understand how the internet works
IS_18.1.4	Create an IP address and domain name
IS_18.1.5	Describe the differences between static and dynamic IP address
IS_18.1.6	Describe the function of a Domain Name Server (DNS)
IS_18.1.7	Explain how to register a domain name
IS_18.1.8	Define important Internet communications protocols and their roles in delivering basic Internet services such as http, https, ftp, tcp-ip, etc
IS_18.1.9	Demonstrate knowledge of standard copyright rules including licensing and citing materials
IS_18.1.10	Interpret the use and purpose of acceptable use policy (AUP) to include ethical behavior

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IS_18.2	Demonstrate ability to develop a basic Web page.
Lrn_Ind_ID	Learning Indicator
IS_18.2.1	Describe different HTML Standards and specifications
IS_18.2.2	Learn about the basic syntax of HTML code
IS_18.2.3	Mark element attribute
IS_18.2.4	Create comments
IS_18.2.5	Describe block-level elements and inline elements
IS_18.2.6	Specify an element's appearance with inline styles
IS_18.2.7	Create and format different types of lists
IS_18.2.8	Describe logical and physical elements
IS_18.2.9	Define empty elements
IS_18.2.10	Insert an inline image into a web page
IS_18.2.11	Insert a horizontal line into a web page
IS_18.2.12	Store meta information in a web document
IS_18.2.13	Display special characters and symbols

IS_18.3	Demonstrate ability to develop a Web page with tables.
Lrn_Ind_ID	Learning Indicator
IS_18.3.1	Work with preformatted text to create a basic text table
IS_18.3.2	Create the basic structure of a graphical table
IS_18.3.3	Organize tables rows into row groups
IS_18.3.4	Add a caption to a table
IS_18.3.5	Describe how to add summary information to a table
IS_18.3.6	Create table borders and gridlines
IS_18.3.7	Specify the width and height for different table elements
IS_18.3.8	Format the contents of table cells
IS_18.3.9	Apply a background image and color to a table
IS_18.3.10	Align a table and cell contents
IS_18.3.11	Describe the different types of page layouts that you can achieve with tables
IS_18.3.12	Work with both fixed-width and fluid layouts
IS_18.3.13	Create a newspaper-style layout using tables

IS_18.4	Demonstrate ability to develop a Web page with frames.
Lrn_Ind_ID	Learning Indicator
IS_18.4.1	Describe the uses of frames
IS_18.4.2	Consider frame layout within a browser window
IS_18.4.3	Display a document within a frame
IS_18.4.4	Format the appearance of frames by setting the margin widths, removing scrollbars, and specifying whether users can resize frames
IS_18.4.5	Direct a link target outside of a frame layout
IS_18.4.6	Add page content for browsers that don't support frames
IS_18.4.7	Format the color and size of frame borders
IS_18.4.8	Incorporate an inline frame in a page

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IS_18.5	Demonstrate ability to develop a Web page with forms.
Lrn_Ind_ID	Learning Indicator
IS_18.5.1	Describe how Web forms can interact with a server-based program
IS_18.5.2	Insert a form into a web page
IS_18.5.3	Create and format an input box for simple text data
IS_18.5.4	Add a form label and link it to a control element
IS_18.5.5	Set up a selection list for a predefined list of data values
IS_18.5.6	Create option buttons for a list of possible field values
IS_18.5.7	Add checkboxes for fields that have two possible values
IS_18.5.8	Organize fields into field sets
IS_18.5.9	Insert a text area box for multiple lines of text data
IS_18.5.10	Generate form buttons to submit or reset a form
IS_18.5.11	Describe how data is sent from a Web form to a server
IS_18.5.12	Describe how to create image fields, hidden fields, and file buttons
IS_18.5.13	Apply tab indices and access keys to control elements
IS_18.6	Demonstrate ability to develop a Web page using cascading style sheets.
Lrn_Ind_ID	Learning Indicator
IS_18.6.1	Learn the history and theory of cascading style sheets
IS_18.6.2	Create inline, embedded, and external styles
IS_18.6.3	Understand style precedence and inheritance
IS_18.6.4	Work with style selectors
IS_18.6.5	Work with element ids and classes
IS_18.6.6	Work with the properties of block-level elements
IS_18.6.7	Float a block level element
IS_18.6.8	Set a display style
IS_18.6.9	Work with margins, padding, and border styles
IS_18.6.10	Use pseudo-elements and pseudo-classes
IS_18.6.11	Work with positioning styles
IS_18.6.12	Manage content overflow
IS_18.6.13	Create style sheets for different media
IS_18.6.14	Work with print styles
IS_18.7	Demonstrate ability to insert multimedia enhancements in a Web page.
Lrn_Ind_ID	Learning Indicator
IS_18.7.1	Define external and embedded media
IS_18.7.2	List the different file formats for digital sound
IS_18.7.3	Link and embed a sound clip
IS_18.7.4	Create background sound
IS_18.7.5	Define the different file formats for digital video
IS_18.7.6	Link and embed a video clip
IS_18.7.7	Describe how to support browsers that don't recognize embedded media
IS_18.7.8	Work with the dynsrc attribute
IS_18.7.9	Describe the history and use of applets
IS_18.7.10	Insert an applet into a Web page

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IS_18.7.11	Modify applet parameters
IS_18.7.12	Understand the Internet Explorer marquee element
IS_18.7.13	Define the object element and understand how to apply it to a variety of embedded objects

IS_18.8 **Demonstrate ability to use XHTML Pages.**

Lrn_Ind_ID	Learning Indicator
IS_18.8.1	Describe the history and theory of XHTML
IS_18.8.2	Describe the three XHTML DTDs and the differences between XHTML versions
IS_18.8.3	List the syntax rules for well-formed XHTML documents
IS_18.8.4	Define the rules for creating valid XHTML documents
IS_18.8.5	Define the rules for creating valid XHTML documents under each of the XHTML DTDs
IS_18.8.6	Create a structured XHTML document
IS_18.8.7	Apply a DTD to an XHTML document
IS_18.8.8	Describe how to apply a namespace
IS_18.8.9	Combine different XML language elements into a single document
IS_18.8.10	Test an XHTML document for well-formedness and validity
IS_18.8.11	Describe how to create a CDATA section for an embedded style sheet

IS_18.9 **Demonstrate ability to create an XML document.**

Lrn_Ind_ID	Learning Indicator
IS_18.9.1	Describe the history and theory of SGML, HTML, and XML
IS_18.9.2	Define the limits of HTML as an information source
IS_18.9.3	Recognize XML vocabularies
IS_18.9.4	Define well-formed and valid XML documents
IS_18.9.5	Describe the basic structure of an XML document
IS_18.9.6	Create an XML declaration
IS_18.9.7	Work with XML comments
IS_18.9.8	Create XML elements and attributes
IS_18.9.9	Work with character and entity references
IS_18.9.10	Describe how SML handles character data, parsed character data, and white space
IS_18.9.11	Work with XML parsers
IS_18.9.12	Understand how Web browsers work with XML documents
IS_18.9.13	Apply a style sheet to an XML document
IS_18.9.14	Create an XML processing instruction
IS_18.9.15	Understand compound documents and the problem of name collision
IS_18.9.16	Declare a namespace for an XML vocabulary
IS_18.9.17	Apply a namespace to an element
IS_18.9.18	Create a default namespace
IS_18.9.19	Apply a namespace to an attribute
IS_18.9.20	Declare a namespace within a CSS style sheet
IS_18.9.21	Apply a namespace to a style selector
IS_18.9.22	Use the escape character to apply a namespace to a selector
IS_18.9.23	Create a compound document containing XML and XHTML elements and attributes

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IS_18.10 Demonstrate ability to validate an XML document.

Lrn_Ind_ID	Learning Indicator
IS_18.10.1	Review the principles of data validation
IS_18.10.2	Create a DOCTYPE declaration
IS_18.10.3	Specify the content of an XML element
IS_18.10.4	Define the structure of child elements
IS_18.10.5	Modify symbols
IS_18.10.6	Set rules for attribute content
IS_18.10.7	Set default values for attributes
IS_18.10.8	Define whether attributes are required or optional
IS_18.10.9	Validate a document with XMLSpy
IS_18.10.10	Accommodate namespaces in DTD
IS_18.10.11	Place internal and external content in an entity
IS_18.10.12	Add entity references to an XML document
IS_18.10.13	Store DTD code in parameter entities
IS_18.10.14	Create comments and conditional sections in a DTD
IS_18.10.15	Create entities for noncharacter data

IS_18.11 Demonstrate ability to work with XML schema.

Lrn_Ind_ID	Learning Indicator
IS_18.11.1	Compare schemas and DTDs
IS_18.11.2	Explore different schema vocabularies
IS_18.11.3	Declare simple type elements and attributes
IS_18.11.4	Declare complex type elements
IS_18.11.5	Apply a schema to an instance document
IS_18.11.6	Work with XML Schema data types
IS_18.11.7	Derive new data types for text strings, numeric values, and dates
IS_18.11.8	Create data types for patterned data using regular expressions
IS_18.11.9	Explore different schema structures
IS_18.11.10	Attach a schema to a namespace
IS_18.11.11	Validate compound instance documents
IS_18.11.12	Import one schema file into another

Information Systems IS_19: Demonstrate Knowledge of Using Client-side Scripting for Web Design

IS_19.1 Demonstrate ability to use client-side scripting.

Lrn_Ind_ID	Learning Indicator
IS_19.1.1	Describe client-side scripting
IS_19.1.2	Define attributes
IS_19.1.3	Define scripting, cookies and frames
IS_19.1.4	Define scripting variable types
IS_19.1.5	Discuss the rules for naming variables
IS_19.1.6	Differentiate between variables and literals
IS_19.1.7	Discuss special codes and how they are used in a literal
IS_19.1.8	Discuss the advantages and disadvantages of using client-side scripting
IS_19.1.9	Discuss the order of precedence in an expression

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IS_19.2 Demonstrate ability to use scripting & HTML.

Lrn_Ind_ID	Learning Indicator
IS_19.2.1	Describe the history and theory of client-side scripting
IS_19.2.2	Create an embedded and external script
IS_19.2.3	Describe basic scripting syntax
IS_19.2.4	Write simple text to the Web page
IS_19.2.5	Work with variables and data
IS_19.2.6	Work with date objects and extract values from dates
IS_19.2.7	Work with expressions and operators
IS_19.2.8	Create and call a function
IS_19.2.9	Work with different conditional statements
IS_19.2.10	Understand Boolean expressions, and comparison, logical, and conditional operators

IS_19.3 Demonstrate ability to use popup windows and scrolling messages.

Lrn_Ind_ID	Learning Indicator
IS_19.3.1	Explain the four basic components of a scrolling message
IS_19.3.2	Write a user-defined function to display a scrolling message in a form text box
IS_19.3.3	Describe the If statement
IS_19.3.4	Define recursion
IS_19.3.5	Describe the focus() method
IS_19.3.6	Write a user-defined function to calculate
IS_19.3.7	Describe the parseInt(), parseFloat & isNaN() built-in functions
IS_19.3.8	Describe the pmath.pow() method

IS_19.4 Demonstrate ability to use image and form objects.

Lrn_Ind_ID	Learning Indicator
IS_19.4.6	Review techniques and tools to debug scripting programs
IS_19.4.1	Define a rolling banner
IS_19.4.2	Create an image object
IS_19.4.3	Write a rolling banner functions
IS_19.4.4	Create, populate, and apply arrays
IS_19.4.5	Describe how to create and apply program loops

Information Systems IS_20: Demonstrate Knowledge of Creating Web Multimedia Objects with Industry Standard Software

IS_20.1 Demonstrate ability to create basic images using graphic editing software.

Lrn_Ind_ID	Learning Indicator
IS_20.1.1	Understand graphic software's work environment
IS_20.1.2	Working with new and existing documents
IS_20.1.3	Working with bitmap Images
IS_20.1.4	Creating shapes
IS_20.1.5	Create and modify text
IS_20.1.6	Working with vector tools
IS_20.1.7	Modify multiple vector objects
IS_20.1.8	Modifying color

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IS_20.1.9	Apply filters to objects and text
IS_20.2	Demonstrate ability to work with and modifying existing images.
Lrn_Ind_ID	Learning Indicator
IS_20.2.1	Work with imported files
IS_20.2.2	Work with bitmap selection tools
IS_20.2.3	Learn about selection areas
IS_20.2.4	Select area based on color
IS_20.2.5	Alter pixels on a bitmap
IS_20.2.6	Working with masks
IS_20.2.7	Understand color
IS_20.2.8	Sample and store color
IS_20.2.9	Using creative commands to change images
IS_20.2.10	Using the red eye removal tool
IS_20.2.11	Apply a blend mode
IS_20.3	Demonstrate ability to create Web page navigation using graphic editing software.
Lrn_Ind_ID	Learning Indicator
IS_20.3.1	Create slices and hotspots
IS_20.3.2	Create links
IS_20.3.3	Create rollovers
IS_20.3.4	Create buttons
IS_20.3.5	Create pop-up menus
IS_20.3.6	Create navigation bar
IS_20.3.7	Integrate graphics software created HTML with HTML Editor
IS_20.4	Demonstrate ability to create animated images.
Lrn_Ind_ID	Learning Indicator
IS_20.4.1	Prepare and plan animation
IS_20.4.2	Create a basic animation
IS_20.4.3	Create frame animation
IS_20.4.4	Add tweening to an animation
IS_20.5	Demonstrate ability to integrate graphics into Web pages.
Lrn_Ind_ID	Learning Indicator
IS_20.5.1	Optimize images for best appearance and load speed
IS_20.5.2	Export to Web safe formats
IS_20.5.3	Integrate graphics with other applications
Information Systems IS_21: Demonstrate Knowledge of Using Authoring Tools for Web Design	
IS_21.1	Demonstrate ability to use an industry standard authoring system.
Lrn_Ind_ID	Learning Indicator
IS_21.1.1	Describe the authoring systems workspace
IS_21.1.2	Open a document and play a movie
IS_21.1.3	Create and save a movie
IS_21.1.4	Work with the Timeline
IS_21.1.5	Distribute a movie

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IS_21.1.6	Plan an application or a Web site
IS_21.2	Demonstrate ability to draw objects.
Lrn_Ind_ID	Learning Indicator
IS_21.2.1	Use drawing tools
IS_21.2.2	Select objects and apply colors
IS_21.2.3	Work with drawn objects
IS_21.2.4	Work with text and text objects
IS_21.2.5	Work with layers and objects
IS_21.3	Demonstrate ability to work with symbols and interactivity.
Lrn_Ind_ID	Learning Indicator
IS_21.3.1	Create symbols and instances
IS_21.3.2	Work with libraries
IS_21.3.3	Create buttons
IS_21.3.4	Assign actions to frames and buttons
IS_21.4	Demonstrate ability to create animations.
Lrn_Ind_ID	Learning Indicator
IS_21.4.1	Create frame-by-frame animations
IS_21.4.2	Create motion-tweened animations
IS_21.4.3	Work with motion guides
IS_21.4.4	Create animation effects
IS_21.4.5	Animate text
IS_21.5	Demonstrate ability to create special effects.
Lrn_Ind_ID	Learning Indicator
IS_21.5.1	Create shape tween animations
IS_21.5.2	Create a mask effect
IS_21.5.3	Add sound
IS_21.5.4	Add scenes
IS_21.5.5	Create an animated navigation bar
IS_21.6	Demonstrate ability to prepare and publish movies.
Lrn_Ind_ID	Learning Indicator
IS_21.6.1	Publish movies
IS_21.6.2	Reduce file size to optimize a movie
IS_21.6.3	Create a Preloader
IS_21.6.4	Use HTML Publish Settings
IS_21.7	Demonstrate ability to import and modify graphics.
Lrn_Ind_ID	Learning Indicator
IS_21.7.1	Produce and import graphics
IS_21.7.2	Break apart bitmaps and use bitmap fills
IS_21.7.3	Trace bitmap graphics
IS_21.7.4	Use imported graphics in a scene

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IS_21.8	Demonstrate ability to build complex animations.
Lrn_Ind_ID	Learning Indicator
IS_21.8.1	Plan for complex movies and animations
IS_21.8.2	Create an animated graphic symbol
IS_21.8.3	Create a movie Clip Symbol
IS_21.8.4	Animate buttons with a movie clip symbol
IS_21.9	Demonstrate ability to use action scripts.
Lrn_Ind_ID	Learning Indicator
IS_21.9.1	Work with Actions panel
IS_21.9.2	Work with targets and movie clip symbols
IS_21.9.3	Create interactive movie clip symbols
IS_21.9.4	Define variables
IS_21.10	Demonstrate ability to add sound and video.
Lrn_Ind_ID	Learning Indicator
IS_21.10.1	Work with sound
IS_21.10.2	Specify synchronization options
IS_21.10.3	Use Action Script with Sound
IS_21.10.4	Work with video
IS_21.11	Demonstrate ability to use advanced action scripts.
Lrn_Ind_ID	Learning Indicator
IS_21.11.1	Create complex interactivity
IS_21.11.2	Use Action Script to create external links
IS_21.11.3	Load new movies
IS_21.11.4	Work with conditional actions
IS_21.12	Demonstrate ability to work with behaviors and components.
Lrn_Ind_ID	Learning Indicator
IS_21.12.1	Work with Behaviors
IS_21.12.2	Work with Components

Information Systems IS_22: Demonstrate Knowledge of Using Industry Standard Software for Web Design

IS_22.1	Demonstrate ability to use industry standard Web design software.
Lrn_Ind_ID	Learning Indicator
IS_22.1.1	View Web pages and use help in Web design software
IS_22.1.2	Plan and define a Web site using industry standard Web design software
IS_22.1.3	Create folders and pages, and set the home page using Web design software
IS_22.1.4	Create and view a site map using Web design software
IS_22.2	Demonstrate ability to develop a Web page using industry standard Web design software.
Lrn_Ind_ID	Learning Indicator
IS_22.2.1	Create head content and page properties using Web design software
IS_22.2.2	Create, import and format text using Web design software
IS_22.2.3	Add links to a Web page using Web design software

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IS_22.2.4	Use the history panel and edit code in using Web design software
IS_22.2.5	Modify and test Web pages using Web design software
IS_22.3	Demonstrate ability to work with text and images using industry standard Web design software.
Lrn_Ind_ID	Learning Indicator
IS_22.3.1	Create unordered and ordered lists using Web design software
IS_22.3.2	Create, apply, and edit cascading style sheets using Web design software
IS_22.3.3	Add styles and attach cascading style sheets using Web design software
IS_22.3.4	Insert and align graphics using Web design software
IS_22.3.5	Enhance an image and use alternate text using Web design software
IS_22.3.6	Insert a background image and perform site maintenance using Web design software
IS_22.4	Demonstrate ability to work with links using industry standard Web design software.
Lrn_Ind_ID	Learning Indicator
IS_22.4.1	Create external and internal links using Web design software
IS_22.4.2	Create internal links to named anchors using Web design software
IS_22.4.3	Insert rollovers using Web design software
IS_22.4.4	Create, modify, and copy a navigation bar using Web design software
IS_22.4.5	Create an image map using Web design software
IS_22.4.6	Manage Web site links using Web design software
IS_22.5	Demonstrate ability to use HTML tables using industry standard Web design software.
Lrn_Ind_ID	Learning Indicator
IS_22.5.1	Create a table using Web design software
IS_22.5.2	Resize, split, and merge cells using Web design software
IS_22.5.3	Insert and align images in table cells using Web design software
IS_22.5.4	Insert text and format cell content using Web design software
IS_22.6	Demonstrate an understanding of the need for a Web server and files when using Web design software.
Lrn_Ind_ID	Learning Indicator
IS_22.6.1	Perform Web site maintenance using Web design software
IS_22.6.2	Publish a Web site and transfer files using Web design software
IS_22.6.3	Check files out and in using Web design software
IS_22.6.4	Cloak files using Web design software
IS_22.6.5	Import and export a site definition using Web design software
IS_22.6.6	Evaluate Web content for legal use
Information Systems	IS_23: Demonstrate Knowledge of Using Desktop Publishing Software
IS_23.1	Evaluate the purposes, functions and features of desktop publishing software.
Lrn_Ind_ID	Learning Indicator
IS_23.1.1	Describe the hardware components used in desktop publishing
IS_23.1.2	Identify tools in toolbars and palettes
IS_23.1.3	Demonstrate knowledge of effective color utilization
IS_23.1.4	Demonstrate knowledge of design proximity, balance and contrast
IS_23.1.5	Explore Web features of desktop publishing

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IS_23.2	Consider a plan for documents to be published including the target audience, text, graphics and printer.
Lrn_Ind_ID	Learning Indicator
IS_23.2.1	Plan the document to be published and consider the target audience
IS_23.2.2	Create a new file and select a design
IS_23.2.3	Decide on text to communicate the desired message effectively
IS_23.2.4	Recognize and use two main categories of proportional typefaces: serif and sans serif
IS_23.2.5	Choose color scheme
IS_23.2.6	Choose graphics for the document
IS_23.2.7	Choose a printer for the document
IS_23.3	Demonstrate ability to insert and edit text, and consider typography when publishing documents.
Lrn_Ind_ID	Learning Indicator
IS_23.3.1	Create a blank document to include page size, margins, page orientation and bleed
IS_23.3.2	Insert and edit text boxes or text frames
IS_23.3.3	Choose fonts and apply font styles
IS_23.3.4	Align text to ensure proper proximity within the document
IS_23.3.5	Set indents and tabs and create lists
IS_23.3.6	Adjust spacing to consider white space, tracking, kerning, and leading
IS_23.3.7	Copy, move and import text utilizing the clipboard
IS_23.3.8	Control text flow by creating and linking columns
IS_23.4	Demonstrate ability to format pages considering contrast, balance, and consistency.
Lrn_Ind_ID	Learning Indicator
IS_23.4.1	Change page setup if necessary to consider gutter, binding and double-sided printing
IS_23.4.2	Set guides for the positioning and alignment of objects
IS_23.4.3	Use master pages to provide consistency through a multiple page document
IS_23.4.4	Insert page numbers as fields on the master pages using headers or footers
IS_23.4.5	Insert and delete pages
IS_23.4.6	Create templates to ensure uniform page setup and formatting characteristics
IS_23.4.7	Select and apply color and font scheme
IS_23.4.8	Use styles to help maintain consistent formatting throughout the document
IS_23.5	Demonstrate ability to create and edit graphics using industry standard graphics software.
Lrn_Ind_ID	Learning Indicator
IS_23.5.1	Differentiate between bitmap (raster) and vector graphics
IS_23.5.2	Identify native formats for bitmap and vector graphics (e.g., JPG, GIF, TIF, BMP, PSD, PHG, PDF, EPS, AI, SWF, PNG, EPS)
IS_23.5.3	Acquire images via scanning, digital camera, internet search, and stock sources
IS_23.5.4	Create images using a digital camera
IS_23.5.5	Export/import images for project requirements (compression, resolution)
IS_23.5.6	Acquire clip art
IS_23.5.7	Use drawing tools to create and manipulate paths (lines and bezier curves) using anchor points, direction handles
IS_23.5.8	Use the design techniques to enhance images (e.g., crop, resize, mask, transform, restore images, apply gradients and utilize painting and drawing tools)
IS_23.5.9	Apply stroke and fill (solid and gradient)

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IS_23.5.10	Select using appropriate tools
IS_23.5.11	Group and ungroup objects
IS_23.5.12	Apply styles and effects
IS_23.5.13	Transform objects
IS_23.5.14	Create layers
IS_23.5.15	Apply transparencies
IS_23.5.16	Utilize Text Tools

IS_23.6 Demonstrate ability to place graphics and enhance publications to add appeal and brand recognition.

Lrn_Ind_ID	Learning Indicator
IS_23.6.1	Work with color and color systems (RGB and CMYK)
IS_23.6.2	Enhance objects with special effects such as shadows, 3-D, textures, gradients and patterns
IS_23.6.3	Enhance text by applying drop caps and text art
IS_23.6.4	Insert horizontal rules before and after text
IS_23.6.5	Apply border art
IS_23.6.6	Create a watermark and adjust the color and transparency
IS_23.6.7	Use design objects such as logos, forms, pull-quotes and mastheads

IS_23.7 Demonstrate ability to deliver publications to a commercial printer for final publication.

Lrn_Ind_ID	Learning Indicator
IS_23.7.1	Plan for publication by considering paper size, bleed, method of binding and budget
IS_23.7.2	Perform prepress checks using a spell checker and proofread documents
IS_23.7.3	Set properties for desktop printing by choosing print and printer options
IS_23.7.4	Enable trapping to avoid color gaps or overlapping
IS_23.7.5	Print a composite and color separations
IS_23.7.6	Deliver files to a commercial printer

Information Systems IS_24: Demonstrate Knowledge of Interactive Media - Video and Audio Techniques and Editing

IS_24.1 Demonstrate pre-production skills and techniques for video projects including file management.

Lrn_Ind_ID	Learning Indicator
IS_24.1.1	Demonstrate appropriate use of video equipment (digital camera, digital camcorder, tripod, microphone, and lights)
IS_24.1.2	Develop proper shooting techniques for camera setting, lighting, etc.
IS_24.1.3	Work with project settings, such as file settings, compression settings, color and sound
IS_24.1.4	Set up video in timeline form
IS_24.1.5	Produce a production schedule

IS_24.2 Demonstrate video and audio capturing, including voice-over for narration.

Lrn_Ind_ID	Learning Indicator
IS_24.2.1	Capture video from an external source such as a digital video camera or tape deck and download it
IS_24.2.2	Import video or still images from other files
IS_24.2.3	Insert a sound object from a clip organizer, file, the Web, or from CD-ROM
IS_24.2.4	Record sound effects, vocals or narration

