COURSE TITLE
Database Design and SQL Programming

DISTRICT COURSE NUMBER **(#0454)**	4-DIGIT STATE COURSE CODE (COMPLETED BY SILT) **4601**

Rationale:	This course is designed to meet the needs of the college-bound students who would like to experience a college level database design and SQL programming course.
Course Description that will be in the Course Directory:	This two-part course teaches data modeling and Structured Query Language (SQL). In the database design curriculum, students learn to analyze complex business scenarios and create a data model, a conceptual representation of an organization's information. In the database programming with SQL curriculum, students implement their database design by creating a physical database using SQL, the industry-standard database programming language. Upon completion of this course, students have the opportunity to take an exam to earn the industry certification Oracle Database SQL Certified Expert.
How Does this Course align with or meet State and District content standards?	This course covers aspects of the Information Technology Industry Sector - Career Pathways Programming and Systems Development.

NCLB Core Subjects:	*Select up to two that apply:*
	☐ Arts ☐ Economics ☐ English ☐ Foreign Language ☐ Geography	☐ Civics and Government ☐ History ☒ Mathematics ☐ Reading / Language Arts ☐ Science	☐ Not Core Subject

CDE CALPADS Course Descriptors: (See Page 2 for Definitions)	CTE TECH PREP COURSE INDICATORS	CTE COURSE CONTENT CODE	INSTRUCTIONAL LEVEL CODE
	☐ Tech Prep (32) ☐ Tech Prep & ROP (33) ☐ ROP ☐ N/A	☐ CTE Introductory (01) ☒ CTE Concentrator (02) ☐ CTE Completer (03) ☐ N/A	☐ Remedial (35) ☐ Honors UC-Certified (39) ☐ Honors Non UC-Certified (34) ☐ College (40) ☐ N/A

Length of Course:	☒ Year ☐ Semester
Grade Level(s):	☐ 9 ☐ 10 ☒ 11 ☒ 12
Credit:	☒ Number of units: **10** ☒ Meets graduation requirements ☒ Request for UC "a–g" requirements ☒ College Prep ☒ Elective ☒ Career Technical
Prerequisites:	C or better in Geometry
Department(s):	Mathematics
District Sites:	EDHS, ORHS, PHS, UMHS
Board of Trustees COS Adoption Date:	May 8, 2012
Textbooks / Instructional Materials:	NA

Funding Source:	NA
Board of Trustees Textbook Adoption Date:	NA

Definitions

CALPADS	California Longitudinal Pupil Achievement Data System
CTE Technical Prep	A course within a CTE technical career pathway or program that has been articulated with a postsecondary education or through an apprenticeship program of at least 2 years following secondary instruction.
Instructional Level Code	Represents a nonstandard instructional level at which the content of a specific course is either above or below a 'standard' course instructional level. These levels may be identified by the actual level of instruction or identified by equating the course content and level of instruction with a state or nationally recognized advanced course of study, such as IB or AP.
Instructional Level Honors, UC Certified	Includes all AP courses.
Instructional Level Honors, non UC Certified	Requires Board approval.
Instructional Level College	Includes ACE courses. Equivalent to college course and content, but not an AP course. Not related to section, but to course.

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UNIT #1: Data Modeling

LEARNING OUTCOME: Students will know the purpose and function of a data model. Students will learn database modeling is the foundation of database design. Students will use the data model as a sound basis for the physical database.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will describe the importance of information requirements. Students will distinguish between a conceptual model and the physical implementation. Students will define an entity and attributes. Students will be able to distinguish entities, and various attributes. Students will be able to select and justify a unique identifier (UID) for an entity. Students will be able to identify an entity relationship diagram (ERD)	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes and partner quizzes. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:
California Information Technology Standards
Foundation Standards
1.0 Academics
Students understand the academic content required for entry into postsecondary education and employment in the Information Technology sector.
(1.a) Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze
relationships, and display data.
2.0 Communications
Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts.
(1.8) Integrate databases, graphics, and spreadsheets into word-processed documents.
(2.3) Generate relevant questions about readings on issues that can be researched.
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.2) Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving
techniques.
 (5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.
 (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
 (5.3) Use critical thinking skills to make informed decisions and solve problems.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
(10.2) Understand the information technology components of major business functions (e.g., marketing, accounting, and human resource management) and their interrelationships.

A. Information Support and Services Pathway
A1.0 Students understand the potential impact of information systems in different organizations:
A1.3 Understand the necessity of and procedures for communicating and documenting technical support provided.
A1.2 Evaluate support needs for different data and systems configurations.
A7.0 Students understand software applications and life-cycle phases:
A7.1 Know common industry-standard software and its applications.
A10.0 Students understand and implement database management systems:
A10.1 Know the variety of data types that are stored in database management systems.
A10.2 Understand the ways in which tools for developing applications can be used to create information systems.

D. Programming and Systems Development Pathway
D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:
D1.1 Develop information technology-based strategies and project plans to solve specific problems.
D1.2 Know how systems and software requirements are determined in various situations.

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UNIT #2: Entity Relationship Diagramming

LEARNING OUTCOME: Students will be able to indentify, name, and track entities and attributes, and identifies how relationships express how entities are mutually related. Student will understand entity relationship diagramming (ER diagramming) as well as constructing an entity relationship diagram (ERD) based on a simple business scenario. Students will know the guidelines for modeling subtypes and supertypes entities in ERDs and will know the process of identifying, defining, and documenting business rules. Students will be able to establish the relationship between entities, categorizing the different type of relationships, assessing optionality and degree, and using name conventions.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will be able to identify various relationships: optionality and cardinality. Students will construct ER diagram components that represent entities and attributes according to diagramming conventions. Students will identify relationships using a matrix diagram and draw and ERD from a matrix diagram. Students will be able to model subtypes and supertype entities in ERDs. Students will be able to establish the relationships between entities.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Teachers will utilize the Internet to find applets to help reinforce concepts. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

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        A10.1 Know the variety of data types that are stored in database management systems.
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D. Programming and Systems Development Pathway
D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:
        D1.1 Develop information technology-based strategies and project plans to solve specific problems.
        D1.2 Know how systems and software requirements are determined in various situations.

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UNIT #3: Unique Identifiers and Normalization

LEARNING OUTCOME: Students will understand the process of normalization and recognize the first, second, and third levels of normalization.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will use define different types of unique identifiers (UIDs) Students will define the purpose of normalization in database models. Students will understand the rule of First Normal Form. Students will understand the rule of Second Normal Form Students will understand the rule of Third Normal Form.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

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Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:

California Information Technology Standards

Foundation Standards

2.0 Communications

Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts.

(1.8) Integrate databases, graphics, and spreadsheets into word-processed documents.

5.0 Problem Solving and Critical Thinking

Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.

(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.

(5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.

(5.3) Use critical thinking skills to make informed decisions and solve problems.

9.0 Leadership and Teamwork

Students understand effective leadership styles, key concepts of group dynamics, team and individual decision making, the benefits of workforce diversity, and conflict resolution.

(9.1) Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace settings.

(9.3) Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals.

10.0 Technical Knowledge and Skills

Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.

(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.

(10.7) Analyze the functions, features, and limitations of different operating systems, environments, applications, and utilities.

A. Information Support and Services Pathway

A1.0 Students understand the potential impact of information systems in different organizations:

    A1.2 Evaluate support needs for different data and systems configurations.

A2.0 Students understand the process of systems implementation:

    A2.1 Understand how to develop the purpose and scope of a systems project.

    A2.2 Understand the criteria and processes for evaluating the functions of information systems.

A3.0 Students understand important aspects of project management:

    A3.1 Analyze business problems by using functional and cost-benefit perspectives.

    A3.3 Know the functions of various tools used to manage projects involving the development of information systems.

A6.0 Students understand how training and support ensure efficient, productive systems operations:

    A6.1 Analyze technical support needs.

    A6.2 Use technical writing and communication skills to work effectively with diverse groups of people.

    A10.1 Know the variety of data types that are stored in database management systems.

    A10.2 Understand the ways in which tools for developing applications can be used to create information systems.

    A10.3 Understand the various structures appropriate for specific applications within database management systems.

    A10.4 Understand the development process of database schemas.

    A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.

D. Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:

    D1.1 Develop information technology-based strategies and project plans to solve specific problems.

    D1.2 Know how systems and software requirements are determined in various situations.

D3.0 Students understand the creation and design of a software program:

    D3.1 Analyze customers' needs and requirements for software.

    D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search, insert, or load-balancing.

    D3.4 Know multiple ways in which to store, retrieve, and access information.

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UNIT #4: Constraints

LEARNING OUTCOME: Students will be able to describe the three main types of constraints – unique identifiers, arcs, and domains, as well as several categories of constraints that cannot be modeled easily.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will be able define the term constraint as it applies to data modeling. Students will be able to diagram an arc constraint to represent an exclusive OR relationship. Students will be able to define a hierarchical relationship. Students will be able to define and represent a recursive relationship in an ERD. Students will construct a model using both recursion and hierarchies to express the same conceptual meaning. Students will construct ERD models that incorporate elements of "data over time" Students will apply rules of entity-relationships diagramming to create an ERD that reflects business rules.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

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Foundation Standards
2.0 Communications
Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts.
(1.8) Integrate databases, graphics, and spreadsheets into word-processed documents.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.
(5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
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9.0 Leadership and Teamwork
Students understand effective leadership styles, key concepts of group dynamics, team and individual decision making, the benefits of workforce diversity, and conflict resolution.
(9.1) Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace settings.
(9.3) Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
(10.7) Analyze the functions, features, and limitations of different operating systems, environments, applications, and utilities.
A. Information Support and Services Pathway
A1.0 Students understand the potential impact of information systems in different organizations:
      A1.2 Evaluate support needs for different data and systems configurations.
A2.0 Students understand the process of systems implementation:
      A2.1 Understand how to develop the purpose and scope of a systems project.
      A2.2 Understand the criteria and processes for evaluating the functions of information systems.
A3.0 Students understand important aspects of project management:
      A3.1 Analyze business problems by using functional and cost-benefit perspectives.
      A3.3 Know the functions of various tools used to manage projects involving the development of information systems.
A6.0 Students understand how training and support ensure efficient, productive systems operations:
      A6.1 Analyze technical support needs.
      A6.2 Use technical writing and communication skills to work effectively with diverse groups of people.
      A10.1 Know the variety of data types that are stored in database management systems.
      A10.2 Understand the ways in which tools for developing applications can be used to create information systems.
      A10.3 Understand the various structures appropriate for specific applications within database management systems.
      A10.4 Understand the development process of database schemas.
      A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.
D. Programming and Systems Development Pathway
D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:
      D1.1 Develop information technology-based strategies and project plans to solve specific problems.
      D1.2 Know how systems and software requirements are determined in various situations.
D3.0 Students understand the creation and design of a software program:
      D3.1 Analyze customers' needs and requirements for software.
      D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search, insert, or load-balancing.
D3.4 Know multiple ways in which to store, retrieve, and access information.

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UNIT #5: Modeling Change

LEARNING OUTCOME: Students will learn about not being able to transfer relationships due to conditional and time-related constraints. Students will also learn the technique "journaling" or "logging".

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will be able distinguish between using date as an attribute and DAY as an entity in a data model. Students will be able to define conditional non-transferability in a time-constrained model. Students will be able to describe the meaning of journaling/logging and be able to identify its use in business. Students will modify an ERD to accommodate new design requirements using the rule of DATE.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:

California Information Technology Standards

Foundation Standards

2.0 Communications

Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts.

(1.8) Integrate databases, graphics, and spreadsheets into word-processed documents.

5.0 Problem Solving and Critical Thinking

Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.

(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.

(5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.

(5.3) Use critical thinking skills to make informed decisions and solve problems.

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10.0 Technical Knowledge and Skills

Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.

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A. Information Support and Services Pathway

A1.0 Students understand the potential impact of information systems in different organizations:

　　　　A1.2 Evaluate support needs for different data and systems configurations.

A2.0 Students understand the process of systems implementation:

　　　　A2.1 Understand how to develop the purpose and scope of a systems project.

　　　　A2.2 Understand the criteria and processes for evaluating the functions of information systems.

A3.0 Students understand important aspects of project management:

　　　　A3.1 Analyze business problems by using functional and cost-benefit perspectives.

　　　　A3.3 Know the functions of various tools used to manage projects involving the development of information systems.

A6.0 Students understand how training and support ensure efficient, productive systems operations:

　　　　A6.1 Analyze technical support needs.

　　　　A6.2 Use technical writing and communication skills to work effectively with diverse groups of people.

　　　　A10.1 Know the variety of data types that are stored in database management systems.

A10.0 Students understand and implement database management systems:

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D. Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:

　　　　D1.1 Develop information technology-based strategies and project plans to solve specific problems.

　　　　D1.2 Know how systems and software requirements are determined in various situations.

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UNIT #6: Transforming From Conceptual Model to Physical Model

LEARNING OUTCOME: Students will be able to transform a conceptual data model into a logical database model. Students are introduced to the language of the database, Structured Query Language (SQL).

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will define a primary and foreign key. Students will identify row, column, primary key, unique key, and foreign key given a diagram of a table containing these elements. Students will identify violations of data-integrity rules. Students will be able to distinguish entity relationship models from database models. Students will transform an entity into a table diagram. Students will apply the rule of relationship mapping to correctly transform 1:M, M:M, and 1:1 relationships. Students will state and apply the table, column, identifiers, relationship, and integrity constraint rules for mapping supertype, subtype, supertype and subtype arc implementations.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

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9.0 Leadership and Teamwork
Students understand effective leadership styles, key concepts of group dynamics, team and individual decision making, the benefits of workforce diversity, and conflict resolution.
(9.1) Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace settings.
(9.3) Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
(10.7) Analyze the functions, features, and limitations of different operating systems, environments, applications, and utilities.
A. Information Support and Services Pathway
A1.0 Students understand the potential impact of information systems in different organizations:
    A1.2 Evaluate support needs for different data and systems configurations.
A2.0 Students understand the process of systems implementation:
    A2.1 Understand how to develop the purpose and scope of a systems project.
    A2.2 Understand the criteria and processes for evaluating the functions of information systems.
A3.0 Students understand important aspects of project management:
    A3.1 Analyze business problems by using functional and cost-benefit perspectives.
    A3.3 Know the functions of various tools used to manage projects involving the development of information systems.
A6.0 Students understand how training and support ensure efficient, productive systems operations:
    A6.1 Analyze technical support needs.
A10.0 Students understand and implement database management systems:
    A10.1 Know the variety of data types that are stored in database management systems.
    A10.2 Understand the ways in which tools for developing applications can be used to create information systems.
    A10.3 Understand the various structures appropriate for specific applications within database management systems.
    A10.4 Understand the development process of database schemas.
    A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.
D. Programming and Systems Development Pathway
D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:
    D1.1 Develop information technology-based strategies and project plans to solve specific problems.
    D1.2 Know how systems and software requirements are determined in various situations.
D3.0 Students understand the creation and design of a software program:
    D3.1 Analyze customers' needs and requirements for software.
    D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search, insert, or load-balancing.
    D3.4 Know multiple ways in which to store, retrieve, and access information.

EDUCATIONAL SERVICES

Department: Mathematics

Course Title: Database Design and SQL Programming (#0454)

UNIT #7: System Development Lifecycle

LEARNING OUTCOME: Students will be able to describe the System Development Life Cycle (SDLC) as a process to develop a database from concept through production.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will list and describe the different stages of the system-development life cycle. Students will identify the role of data modeling in the SDLC. Students will create sample tables from ERDs. Students will insert sample data into created tables.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:

California Information Technology Standards

Foundation Standards
2.0 Communications
Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts.
(1.1) Demonstrate an understanding of the elements of discourse (e.g., purpose, speaker, audience, form) when completing narrative, expository, persuasive, or descriptive writing assignments.
(1.6) Develop presentations by using clear research questions and creative and critical research strategies (e.g., field studies, oral histories, interviews, experiments, electronic sources).
(1.7) Use systematic strategies to organize and record information (e.g., anecdotal scripting, annotated bibliographies).
(1.8) Integrate databases, graphics, and spreadsheets into word-processed documents.
(2.3) Generate relevant questions about readings on issues that can be researched.
(2.4) Synthesize the content from several sources or works by a single author dealing with a single issue; paraphrase the ideas and connect them to other sources and related topics to demonstrate comprehension.
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.1) Understand past, present, and future technological advances as they relate to a chosen pathway.
(4.2) Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
(4.3) Understand the influence of current and emerging technology on selected segments of the economy.
(4.4) Understand effective technologies used in Web site development and the Internet.
(4.5) Know procedures for maintaining secure information, preventing loss, and reducing risk.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
 (5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.
 (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
 (5.3) Use critical thinking skills to make informed decisions and solve problems.
9.0 Leadership and Teamwork
Students understand effective leadership styles, key concepts of group dynamics, team and individual decision making, the benefits of workforce diversity, and conflict resolution.
(9.1) Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace settings.
(9.3) Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals.
(9.4) Know multiple approaches to conflict resolution and their appropriateness for a variety of situations in the workplace.
(9.5) Understand how to interact with others in ways that demonstrate respect for individual and cultural differences and the attitudes and feelings of others.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
(10.2) Understand the information technology components of major business functions (e.g., marketing, accounting, and human resource management) and their interrelationships.
(10.6) Understand the interrelationships between hardware components and supportive software.
(10.8) Know how to use appropriate help resources (e.g., help desks, online help, manuals) to install, configure, upgrade, diagnose, and repair operating systems, environments, applications, and utilities.

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A. Information Support and Services Pathway

A1.0 Students understand the potential impact of information systems in different organizations:

   A1.1 Evaluate the systems-development life cycle and develop appropriate plans to maintain a given system after assessing its impact on resources.

   A1.2 Evaluate support needs for different data and systems configurations.

   A1.3 Understand the necessity of and procedures for communicating and documenting technical support provided.

A2.0 Students understand the process of systems implementation:

   A2.1 Understand how to develop the purpose and scope of a systems project.

   A2.2 Understand the criteria and processes for evaluating the functions of information systems.

   A2.3 Know the processes needed to install and maintain systems.

   A2.4 Know appropriate documentation support for information systems.

A7.0 Students understand software applications and life-cycle phases:

   A7.1 Know common industry-standard software and its applications.

   A7.4 Diagnose and solve software application problems.

D. Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:

   D1.1 Develop information technology-based strategies and project plans to solve specific problems.

   D1.2 Know how systems and software requirements are determined in various situations.

D3.0 Students understand the creation and design of a software program:

   D3.1 Analyze customers' needs and requirements for software.

EDUCATIONAL SERVICES

Department: Mathematics

Course Title: Database Design and SQL Programming (#0454)

UNIT #8: Introduction to SQL

LEARNING OUTCOME: Students will become familiar with the language of database – Structured Query Language (SQL). Students learn how to extract data from the database and learn the rules and guidelines needed to construct valid SQL statements.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will be able to define a relational database and relate the importance of a database to everyday life. Students will identify table-key terms, including row, column, field, primary key, and foreign key. Students will be able to use the DELETE and ALTER TABLE commands to correct mistakes or make revisions to a table. Students will be able to apply the rules of SQL to display all columns and a subset of columns specified by criteria Students will use correct syntax using the WHERE clause to select specific columns and/or rows in a table, modify the way data is displayed, and/or perform calculations using arithmetic expressions and operators. Students will use conditional operators, AND, OR and NOT as well as logical conditions IN and NOT IN to restrict the number of rows returned.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:
California Information Technology Standards
Foundation Standards
1.0 Academics
Students understand the academic content required for entry into postsecondary education and employment in the Information Technology sector.
(1.1) Students use properties of numbers to demonstrate whether assertions are true or false.
 (15.0) Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.2) Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
(5.3) Use critical thinking skills to make informed decisions and solve problems.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.

A. Information Support and Services Pathway
A10.0 Students understand and implement database management systems:
      A10.1 Know the variety of data types that are stored in database management systems.
      A10.2 Understand the ways in which tools for developing applications can be used to create information systems.
      A10.3 Understand the various structures appropriate for specific applications within database management systems.
      A10.4 Understand the development process of database schemas.
      A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.

D. Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:
      D1.1 Develop information technology-based strategies and project plans to solve specific problems.
      D1.2 Know how systems and software requirements are determined in various situations.
D2.0 Students understand programming languages:
      D2.1 Know the fundamentals of programming languages and concepts.
      D2.2 Compare programs by using control structures, procedures, functions, parameters, variables, error recovery, and recursion.
      D2.3 Understand digital logic, machine-level representation of data, memory-system organization, and use of assembly-level programming architecture.
D3.0 Students understand the creation and design of a software program:
      D3.1 Analyze customers' needs and requirements for software.
      D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search, insert, or load-balancing.
      D3.4 Know multiple ways in which to store, retrieve, and access information.
D5.0 Students understand the importance of quality assurance tasks in producing effective and efficient products:
      D5.4 Know various sorting and searching methods and their comparative advantages.

EDUCATIONAL SERVICES

Department: Mathematics

Course Title: Database Design and SQL Programming (#0454)

UNIT #9: Single Row Functions

LEARNING OUTCOME: Students will demonstrate knowledge of various common functions to manipulate data. Students will use single-row functions to focus on several important topics including creating queries that require the use of numeric, character, and date functions.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will select and apply single-row functions. Students will select and apply character case-manipulation functions. Students will select and apply the single-row number functions ROUND, TRUNC, and MOD in a SQL query. Students will demonstrate the proper use of the arithmetic operators with dates and use of the SYSDATE and date functions. Students will demonstrate and explain the evaluation of nested functions. Students will explain the use of general functions to deal with null values in data. Students will construct and execute a SQL query that correctly uses the DECODE and CASE functions.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

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Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:
California Information Technology Standards

Foundation Standards
1.0 Academics
Students understand the academic content required for entry into postsecondary education and employment in the Information Technology sector.
(1.1) Students use properties of numbers to demonstrate whether assertions are true or false.
 (15.0) Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.2) Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
(5.3) Use critical thinking skills to make informed decisions and solve problems.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
A. Information Support and Services Pathway
A10.0 Students understand and implement database management systems:
      A10.1 Know the variety of data types that are stored in database management systems.
      A10.2 Understand the ways in which tools for developing applications can be used to create information systems.
      A10.3 Understand the various structures appropriate for specific applications within database management systems.
      A10.4 Understand the development process of database schemas.
      A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.

D. Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:
      D1.1 Develop information technology-based strategies and project plans to solve specific problems.
      D1.2 Know how systems and software requirements are determined in various situations.
D2.0 Students understand programming languages:
      D2.1 Know the fundamentals of programming languages and concepts.
      D2.2 Compare programs by using control structures, procedures, functions, parameters, variables, error recovery, and recursion.
      D2.3 Understand digital logic, machine-level representation of data, memory-system organization, and use of assembly-level programming architecture.
D3.0 Students understand the creation and design of a software program:
      D3.1 Analyze customers' needs and requirements for software.
      D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search, insert, or load-balancing.
      D3.4 Know multiple ways in which to store, retrieve, and access information.
D5.0 Students understand the importance of quality assurance tasks in producing effective and efficient products:
      D5.4 Know various sorting and searching methods and their comparative advantages.

EDUCATIONAL SERVICES

Department: Mathematics

Course Title: Database Design and SQL Programming (#0454)

UNIT #10: Executing Database Joins

LEARNING OUTCOME: Separating data into individual tables and being able to associate the tables with one another is the heart of relational database design. Students will use the join syntax that allows separate tables to be combined in one query.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will construct and execute a natural join and cross join. Students will define the relationship between a cross join and a Cartesian product and between a natural join and an equijoin. Students will define and use an inner join, outer join, left outer join, right outer join, and full outer join. Students will construct and execute a SELECT statement to join a table to itself using a self-join.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:
California Information Technology Standards

Foundation Standards
1.0 Academics
Students understand the academic content required for entry into postsecondary education and employment in the Information Technology sector.
(1.1) Students use properties of numbers to demonstrate whether assertions are true or false.
(15.0) Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.2) Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
(5.3) Use critical thinking skills to make informed decisions and solve problems.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
A. Information Support and Services Pathway
A10.0 Students understand and implement database management systems:
    A10.1 Know the variety of data types that are stored in database management systems.
    A10.2 Understand the ways in which tools for developing applications can be used to create information systems.
    A10.3 Understand the various structures appropriate for specific applications within database management systems.
    A10.4 Understand the development process of database schemas.
    A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.

D. Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:
    D1.1 Develop information technology-based strategies and project plans to solve specific problems.
    D1.2 Know how systems and software requirements are determined in various situations.
D2.0 Students understand programming languages:
    D2.1 Know the fundamentals of programming languages and concepts.
    D2.2 Compare programs by using control structures, procedures, functions, parameters, variables, error recovery, and recursion.
    D2.3 Understand digital logic, machine-level representation of data, memory-system organization, and use of assembly-level programming architecture.
D3.0 Students understand the creation and design of a software program:
    D3.1 Analyze customers' needs and requirements for software.
    D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search, insert, or load-balancing.
    D3.4 Know multiple ways in which to store, retrieve, and access information.
D5.0 Students understand the importance of quality assurance tasks in producing effective and efficient products:
    D5.4 Know various sorting and searching methods and their comparative advantages.

EDUCATIONAL SERVICES

Department: Mathematics

Course Title: Database Design and SQL Programming (#0454)

UNIT #11: Group Functions

LEARNING OUTCOME: Students will demonstrate the use of group functions. These group functions allow logical operations on sets of rows to give one result per group. Examples of group functions include: finding the average, maximum, minimum and sum.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will construct a SQL query using group functions. Students will be able to define and give an example of seven group functions: SUM, AVG, COUNT, MIN, MAX, STDDEV, and VARIANCE. Students will use DISTINCT and the NVL function with group functions. Students will be able to construct and execute a SQL query using GROUP BY and GROUP BY…HAVING. Students will be able to nest group functions. Students will use ROLLUP and CUBE operations and GROUPING SETS to produce values. Students will define the purpose of SET operators and use it to combine multiple queries into a single query.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:
California Information Technology Standards

Foundation Standards
1.0 Academics
Students understand the academic content required for entry into postsecondary education and employment in the Information Technology sector.
(1.1) Students use properties of numbers to demonstrate whether assertions are true or false.
 (15.0) Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.2) Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
(5.3) Use critical thinking skills to make informed decisions and solve problems.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
A. Information Support and Services Pathway
A10.0 Students understand and implement database management systems:
     A10.1 Know the variety of data types that are stored in database management systems.
     A10.2 Understand the ways in which tools for developing applications can be used to create information systems.
     A10.3 Understand the various structures appropriate for specific applications within database management systems.
     A10.4 Understand the development process of database schemas.
     A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.

D. Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:
     D1.1 Develop information technology-based strategies and project plans to solve specific problems.
     D1.2 Know how systems and software requirements are determined in various situations.
D2.0 Students understand programming languages:
     D2.1 Know the fundamentals of programming languages and concepts.
     D2.2 Compare programs by using control structures, procedures, functions, parameters, variables, error recovery, and recursion.
     D2.3 Understand digital logic, machine-level representation of data, memory-system organization, and use of assembly-level programming architecture.
D3.0 Students understand the creation and design of a software program:
     D3.1 Analyze customers' needs and requirements for software.
     D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search, insert, or load-balancing.
     D3.4 Know multiple ways in which to store, retrieve, and access information.
D5.0 Students understand the importance of quality assurance tasks in producing effective and efficient products:
     D5.4 Know various sorting and searching methods and their comparative advantages.

EDUCATIONAL SERVICES

Department: Mathematics

Course Title: Database Design and SQL Programming (#0454)

UNIT #12: Creating Subqueries

LEARNING OUTCOME: Students will create subqueries and know how subqueries are used in SQL.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will know the fundamentals of subqueries. Students will be able to construct a single-row subquery. Students will use IN, ANY and ALL in multiple-row subqueries. Students will indentify and construct correlated subqueries. Students will construct subqueries using WHERE, HAVING, and WITH clauses.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:
California Information Technology Standards

Foundation Standards
1.0 Academics
Students understand the academic content required for entry into postsecondary education and employment in the Information Technology sector.
(1.1) Students use properties of numbers to demonstrate whether assertions are true or false.
 (15.0) Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.2) Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
(5.3) Use critical thinking skills to make informed decisions and solve problems.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
A. Information Support and Services Pathway
A10.0 Students understand and implement database management systems:
      A10.1 Know the variety of data types that are stored in database management systems.
      A10.2 Understand the ways in which tools for developing applications can be used to create information systems.
      A10.3 Understand the various structures appropriate for specific applications within database management systems.
      A10.4 Understand the development process of database schemas.
      A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.

D. Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:
      D1.1 Develop information technology-based strategies and project plans to solve specific problems.
      D1.2 Know how systems and software requirements are determined in various situations.
D2.0 Students understand programming languages:
      D2.1 Know the fundamentals of programming languages and concepts.
      D2.2 Compare programs by using control structures, procedures, functions, parameters, variables, error recovery, and recursion.
      D2.3 Understand digital logic, machine-level representation of data, memory-system organization, and use of assembly-level programming architecture.
D3.0 Students understand the creation and design of a software program:
      D3.1 Analyze customers' needs and requirements for software.
      D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search, insert, or load-balancing.
      D3.4 Know multiple ways in which to store, retrieve, and access information.
D5.0 Students understand the importance of quality assurance tasks in producing effective and efficient products:
      D5.4 Know various sorting and searching methods and their comparative advantages.

EDUCATIONAL SERVICES

Department: Mathematics

Course Title: Database Design and SQL Programming (#0454)

UNIT #13: Constructing Data Manipulation Language (DML) Statements

LEARNING OUTCOME: Students will use Data Manipulation Language (DML) as a core part of SQL. Students will use DML statements to add, update, delete or merge data in a database and learn these statements form a logical unit of work called a "transaction."

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will use INSERT, UPDATE, and DELETE statements in a query. Students will explain how foreign-key and primary-key constraints affect UPDATE and DELETE statements. Students will know when to specify a DEFAULT value. Students will know how to construct a MERGE statement. Students will know how to construct DML statements using subqueries.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:
California Information Technology Standards

Foundation Standards
1.0 Academics
Students understand the academic content required for entry into postsecondary education and employment in the Information Technology sector.
(1.1) Students use properties of numbers to demonstrate whether assertions are true or false.
 (15.0) Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.2) Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
(5.3) Use critical thinking skills to make informed decisions and solve problems.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
A. Information Support and Services Pathway
A10.0 Students understand and implement database management systems:
>   A10.1 Know the variety of data types that are stored in database management systems.
>   A10.2 Understand the ways in which tools for developing applications can be used to create information systems.
>   A10.3 Understand the various structures appropriate for specific applications within database management systems.
>   A10.4 Understand the development process of database schemas.
>   A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.

D. Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:
>   D1.1 Develop information technology-based strategies and project plans to solve specific problems.
>   D1.2 Know how systems and software requirements are determined in various situations.
D2.0 Students understand programming languages:
>   D2.1 Know the fundamentals of programming languages and concepts.
>   D2.2 Compare programs by using control structures, procedures, functions, parameters, variables, error recovery, and recursion.
>   D2.3 Understand digital logic, machine-level representation of data, memory-system organization, and use of assembly-level programming architecture.
D3.0 Students understand the creation and design of a software program:
>   D3.1 Analyze customers' needs and requirements for software.
>   D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search, insert, or load-balancing.
>   D3.4 Know multiple ways in which to store, retrieve, and access information.
D5.0 Students understand the importance of quality assurance tasks in producing effective and efficient products:
>   D5.4 Know various sorting and searching methods and their comparative advantages.

EDUCATIONAL SERVICES

Department: Mathematics

Course Title: Database Design and SQL Programming (#0454)

UNIT #14: Database Management

LEARNING OUTCOME: Students will use Data Definition Language to create, alter, remove, and drop tables. Students will use constraints to prevent invalid data from entering a table. Students will learn how to create and manage views, or virtual tables, from existing tables. Lastly, students will learn how to work with sequences, indexes and synonyms.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will categorize the main database objects. Students will be able to use DDL to create and modify tables using the appropriate data type for each column. Students will know how constraints are created at the time of a table creation. Students will know the uses of views from the standpoint of a database administrator and how to create a SQL statement to retrieve data from a view and remove a view. Students will be work with sequences to generate unique values and create integers required for primary keys. Students will use indexes to provide direct and fast access to rows in a table. Students will use synonyms to provide an alternative name for a table, view, sequence, procedure, or other objects.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:
California Information Technology Standards
Foundation Standards
1.0 Academics
Students understand the academic content required for entry into postsecondary education and employment in the Information Technology sector.
(1.a) Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze
relationships, and display data.
(1.1) Students use properties of numbers to demonstrate whether assertions are true or false.
(15.0) Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.
2.0 Communications
Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts.
(1.8) Integrate databases, graphics, and spreadsheets into word-processed documents.
(2.4) Synthesize the content from several sources or works by a single author dealing with a single issue; paraphrase the ideas and connect them to other sources and related
topics to demonstrate comprehension.
3.0 Career Planning and Management
Students understand how to make effective decisions, use career information, and manage personal career plans.
(3.1) Know the personal qualifications, interests, aptitudes, knowledge, and skills necessary to succeed in careers.
(3.2) Understand the scope of career opportunities and know the requirements for education, training, and licensure.
(3.4) Understand the role and function of professional organizations, industry associations, and organized labor in a productive society.
(3.5) Understand the past, present, and future trends that affect careers, such as technological developments and societal trends, and the resulting need for lifelong learning.
(3.6) Know important strategies for self-promotion in the hiring process, such as job applications, résumé writing, interviewing skills, and preparation of a portfolio.
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.5) Know procedures for maintaining secure information, preventing loss, and reducing risk.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
(5.3) Use critical thinking skills to make informed decisions and solve problems.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
(10.2) Understand the information technology components of major business functions (e.g., marketing, accounting, and human resource management) and their interrelationships.
(10.6) Understand the interrelationships between hardware components and supportive software.
(10.8) Know how to use appropriate help resources (e.g., help desks, online help, manuals) to install, configure, upgrade, diagnose, and repair operating systems, environments,
applications, and utilities.

A. Information Support and Services Pathway

A1.0 Students understand the potential impact of information systems in different organizations:

    A1.1 Evaluate the systems-development life cycle and develop appropriate plans to maintain a given system after assessing its impact on resources.

    A1.2 Evaluate support needs for different data and systems configurations.

    A1.3 Understand the necessity of and procedures for communicating and documenting technical support provided.

A2.0 Students understand the process of systems implementation:

    A2.3 Know the processes needed to install and maintain systems.

    A2.1 Understand how to develop the purpose and scope of a systems project.

A7.0 Students understand software applications and life-cycle phases:

    A7.4 Diagnose and solve software application problems.

A8.0 Students understand the importance of reading, writing, and comprehending documentation in a technical environment:

    A8.1 Know appropriate search procedures for different types of information, sources, and queries.

    A8.2 Evaluate the accuracy, relevance, and comprehensiveness of retrieved information.

A9.0 Students understand and implement quality assurance processes:

    A9.1 Know the characteristics and functions of available quality assurance tools and procedures for a variety of situations.

    A9.2 Understand techniques for optimizing quality assurance processes.

A10.0 Students understand and implement database management systems:

    A10.1 Know the variety of data types that are stored in database management systems.

    A10.2 Understand the ways in which tools for developing applications can be used to create information systems.

    A10.3 Understand the various structures appropriate for specific applications within database management systems.

    A10.4 Understand the development process of database schemas.

    A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.

D. Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements:

    D1.1 Develop information technology-based strategies and project plans to solve specific problems.

    D1.2 Know how systems and software requirements are determined in various situations.

D2.0 Students understand programming languages:

    D2.1 Know the fundamentals of programming languages and concepts.

    D2.2 Compare programs by using control structures, procedures, functions, parameters, variables, error recovery, and recursion.

    D2.3 Understand digital logic, machine-level representation of data, memory-system organization, and use of assembly-level programming architecture.

D3.0 Students understand the creation and design of a software program:

    D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search, insert, or load-balancing.

    D3.4 Know multiple ways in which to store, retrieve, and access information.

EDUCATIONAL SERVICES

Department: Mathematics

Course Title: Database Design and SQL Programming (#0454)

UNIT #15: Fundamentals of Database Security

LEARNING OUTCOME: Students will know basic system privileges and distinguishes between system or user system privileges. Students will be introduced to regular expressions, a widely used mechanism in the computing industry for performing simple and complex pattern matching.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will know how to control user access. Students will know how to create and revoke object privileges. Students will describe regular expressions.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:
California Information Technology Standards
Foundation Standards
1.0 Academics
Students understand the academic content required for entry into postsecondary education and employment in the Information Technology sector.
(1.a) Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.
(1.1) Students use properties of numbers to demonstrate whether assertions are true or false.
(15.0) Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.

2.0 Communications
Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts.
(1.8) Integrate databases, graphics, and spreadsheets into word-processed documents.
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.2) Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
(4.5) Know procedures for maintaining secure information, preventing loss, and reducing risk.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
(5.3) Use critical thinking skills to make informed decisions and solve problems.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
(10.2) Understand the information technology components of major business functions (e.g., marketing, accounting, and human resource management) and their interrelationships.
(10.6) Understand the interrelationships between hardware components and supportive software.
(10.8) Know how to use appropriate help resources (e.g., help desks, online help, manuals) to install, configure, upgrade, diagnose, and repair operating systems, environments, applications, and utilities.

A. Information Support and Services Pathway
A1.0 Students understand the potential impact of information systems in different organizations:
    A1.2 Evaluate support needs for different data and systems configurations.
    A1.3 Understand the necessity of and procedures for communicating and documenting technical support provided.
A2.0 Students understand the process of systems implementation:
    A2.4 Know appropriate documentation support for information systems.
A6.0 Students understand how training and support ensure efficient, productive systems operations:
    A6.1 Analyze technical support needs.
A7.0 Students understand software applications and life-cycle phases:
    A7.1 Know common industry-standard software and its applications.
    A7.4 Diagnose and solve software application problems.
A8.0 Students understand the importance of reading, writing, and comprehending documentation in a technical environment:
    A8.1 Know appropriate search procedures for different types of information, sources, and queries.
    A8.2 Evaluate the accuracy, relevance, and comprehensiveness of retrieved information.

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A9.0 Students understand and implement quality assurance processes:
    A9.1 Know the characteristics and functions of available quality assurance tools and procedures for a variety of situations.
    A9.2 Understand techniques for optimizing quality assurance processes.
A10.0 Students understand and implement database management systems:
    A10.1 Know the variety of data types that are stored in database management systems.
    A10.2 Understand the ways in which tools for developing applications can be used to create information systems.
    A10.3 Understand the various structures appropriate for specific applications within database management systems.
    A10.4 Understand the development process of database schemas.
    A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.

D. Programming and Systems Development Pathway
D2.0 Students understand programming languages:
    D2.2 Compare programs by using control structures, procedures, functions, parameters, variables, error recovery, and recursion.
D3.0 Students understand the creation and design of a software program:
    D3.1 Analyze customers' needs and requirements for software.
    D3.3 Understand the abstract organization of information and how programs maintain the properties of the data structure while they perform such operations as search,
        insert, or load-balancing.
    D3.4 Know multiple ways in which to store, retrieve, and access information.
D5.0 Students understand the importance of quality assurance tasks in producing effective and efficient products:
    D5.4 Know various sorting and searching methods and their comparative advantages.
D6.0 Students understand the importance of effective interfaces in the interaction between humans and computer systems:
    D6.1 Understand how to support access, privacy, and high ethical standards in computing.
    D6.2 Use knowledge of cognitive, physical, and social interactions to create and design user-friendly computer practices and applications that meet the needs of the
        market.

EDUCATIONAL SERVICES

Department: Mathematics

Course Title: Database Design and SQL Programming (#0454)

UNIT #16: Understanding Database Transactions

LEARNING OUTCOME: Students will gain an understanding of the various methods for altering database transactions and the reasons a business would want to control transaction processing.

LEARNING OUTCOME	INSTRUCTIONAL STRATEGIES	ASSESSMENTS	INTERVENTIONS
1. What students will learn, know, and be able to do? (Must be aligned to state content standards.) Students will know how to use COMMIT, ROLLBACK, and SAVEPOINT as they relate to data transactions. Students will know the importance of controlling the flow of transaction processing.	2. Instructional strategies that will be used to engage students. Teachers will use direct instruction utilizing Smart Notebook software to teach and demonstrate each concept to students. Students will work independently, in pairs and in groups to practice, apply and discuss each concept. Warm-ups, quizzes, Smart Responder activities and teacher monitoring will assess progress and check for understanding.	3. How will we know that students have learned? Include both Formative (for learning) and Summative (of learning) assessment examples. Formative assessments will include warm-ups, homework, individual quizzes, partner quizzes, and group discussion of solutions. Summative assessments will include chapter or unit tests.	4. What will we do if students don't learn? If many students demonstrate lack of understanding of a given topic re-teaching including warm-ups and other activities will occur. If individual students demonstrate lack of understanding of a given topic teachers will advise options available by teacher/site. These may include peer-tutoring, Academic Recovery, D-Back hour, Blue Latte, teacher office hours. 5. What will we do if students already know it? A minimum of independent practice problems will be provided then the students will be allowed to move to the next topic.

Content Area Standards (Please identify the source)

The students will demonstrate mastery of the following content standards:
California Information Technology Standards
Foundation Standards
4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.
(4.2) Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
(4.5) Know procedures for maintaining secure information, preventing loss, and reducing risk.
5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.
(5.1) Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. (5.2) Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
(5.3) Use critical thinking skills to make informed decisions and solve problems.
10.0 Technical Knowledge and Skills
Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.
(10.1) Know how to use a variety of business- and industry-standard software and hardware, including major proprietary and open standards.
(10.6) Understand the interrelationships between hardware components and supportive software.
(10.8) Know how to use appropriate help resources (e.g., help desks, online help, manuals) to install, configure, upgrade, diagnose, and repair operating systems, environments, applications, and utilities.
A. Information Support and Services Pathway
A1.0 Students understand the potential impact of information systems in different organizations:
       A1.2 Evaluate support needs for different data and systems configurations.
A2.0 Students understand the process of systems implementation:
       A2.3 Know the processes needed to install and maintain systems.
       A2.4 Know appropriate documentation support for information systems.
A7.0 Students understand software applications and life-cycle phases:
       A7.4 Diagnose and solve software application problems.
A8.0 Students understand the importance of reading, writing, and comprehending documentation in a technical environment:
       A8.1 Know appropriate search procedures for different types of information, sources, and queries.
       A8.2 Evaluate the accuracy, relevance, and comprehensiveness of retrieved information.
A9.0 Students understand and implement quality assurance processes:
       A9.1 Know the characteristics and functions of available quality assurance tools and procedures for a variety of situations.
       A9.2 Understand techniques for optimizing quality assurance processes.
A10.0 Students understand and implement database management systems:
       A10.1 Know the variety of data types that are stored in database management systems.
       A10.3 Understand the various structures appropriate for specific applications within database management systems.
       A10.4 Understand the development process of database schemas.
       A10.5 Understand the possibilities for and limitations of converting data between databases and various applications.
D. Programming and Systems Development Pathway
D5.0 Students understand the importance of quality assurance tasks in producing effective and efficient products:
       D5.4 Know various sorting and searching methods and their comparative advantages.
D6.0 Students understand the importance of effective interfaces in the interaction between humans and computer systems:
       D6.1 Understand how to support access, privacy, and high ethical standards in computing.
       D6.2 Use knowledge of cognitive, physical, and social interactions to create and design user-friendly computer practices and applications that meet the needs of the
          market.