

COMPUTER SCIENCE II: DATABASES

Computer Science II: Databases introduces students to the basic concepts of databases including types of databases, general database environments, and the importance of data to the business world. Discussion with hands-on activities will include database design of logical and physical layers, normalization of tables, and development of tables, queries, reports, and applications. Students will be familiarized with the use of ANSI/ISO standard Structured Query Language. Discussions will include database administration and data maintenance. Students will be introduced to data concepts such as data warehousing, data mining, and BIG data. Students will develop a business application using an industry standard database software such as Access, MySQL, Oracle, etc. Students will be required to demonstrate skills such as team building, work ethic, communications, documentation, and

- DOE Code: 5250
- Recommended Grade Level: 11, 12
- Required Prerequisite: Computer Science I
- Credits: 2 semester course, 2 semesters required, 1-3 credits per semester, 6 credits maximum
- Counts as a Directed Elective or Elective for all diplomas

Dual Credit

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school-based or work-based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in Business Professional of America, DECA, or Future Business Leaders of America, the CTSOs for this area.

Content Standards

Domain – Database Design and Management

Core Standard 1 Students design and manage databases.

Standards

- CS2D-1.1 Identify types and nature of databases in a business setting
- CS2D-1.2 Understand and apply terminology of database usage

- CS2D-1.3 Evaluate data and performance needed to inform decision making in a business setting
- CS2D-1.4 Describe the differences among relational, hierarchical, network and no-SQL database structures
- CS2D-1.5 Compare structured versus unstructured data using database management systems
- CS2D-1.6 Describe general structure and organization of a relational database and explain the functions of the basic relational operators
- CS2D-1.7 Apply normalization techniques in the design of databases, and define and describe the 1NF, 2NF, 3NF, and BCNF
- CS2D-1.8 Analyze the impact of technology on database size and performance
- CS2D-1.9 Explain how defining and creating database files affects computer space and performance
- CS2D-1.10 Plan, design, create and modify a database using objects and elements
- CS2D-1.11 Describe, define, and use basic data types
- CS2D-1.12 Create stored procedures and functions
- CS2D-1.13 Describe database field names, field types, relationships among tables, and create and entity-relationship diagram (ERD)
- CS2D-1.14 Create database objects, retrieve, and manipulate data using SQL commands
- CS2D-1.15 Identify data integrity and security requirements
- CS2D-1.16 Discuss the concepts and use of BIG data, data warehousing, and data mining
- CS2D-1.17 Explain the fundamental concepts of an information system, including the life cycle, components, and flow of information within an organization
- CS2D-1.18 Discuss the basic use of statistics and reporting within an organization
- CS2D-1.19 Synthesize project management best practices to create a database
- CS2D-1.20 Plan, design, create, and modify a database by collaborating with other students

Domain – Administration and Management

Core Standard 2 Students analyze the administrative and managerial considerations for a database.

Standards

- CS2D-2.1 Investigate best practices in database administration
- CS2D-2.2 Identify data integrity, security and legal requirements
- CS2D-2.3 Create documentation for a database
- CS2D-2.4 Assess normalization techniques
- CS2D-2.5 Analyze the relationship between database design and storage requirements

Domain – Structured Query Language (SQL)

Core Standard 3 Students utilize the main SQL statements while creating and managing databases.

Standards

- CS2D-3.1 Discuss procedural versus declarative languages
- CS2D-3.2 Use SQL to identify and describe the structure and contents of a database
- CS2D-3.3 Design data definition language (DDL) statements to create and manage tables
- CS2D-3.4 Implement keys and constraints to ensure data and referential integrity
- CS2D-3.5 Utilize SQL data manipulation language (DML) commands to insert, update, and delete data

- CS2D-3.6 Distinguish between Data Control Language (DCL) and Transaction Control Language (TCL) statement controls for access levels on database objects and maintaining integrity
- CS2D-3.7 Utilize SQL commands to retrieve data from single and multiple tables
- CS2D-3.8 Use the Set Operators to combine the results of multiple queries
- CS2D-3.9 Demonstrate the use of table joins and aggregate functions
- CS2D-3.10 Modify SQL commands to restrict and sort data
- CS2D-3.11 Use single-row and multiple-row subqueries to improve query performance
- CS2D-3.12 Differentiate between single-row and multi-row functions
- CS2D-3.13 Demonstrate the use of Arithmetic and Logical expressions, and Conversion Functions
- CS2D-3.14 Utilize optimization and performance techniques
- CS2D-3.15 Create and utilize schema objects including views, sequences, indexes, and synonyms

Domain – Database Mechanisms

Core Standard 4 Students employ an industry standard database such as Access, mySQL, Oracle, etc. to produce a database.

Standards

- CS2D-4.1 Describe Oracle Database Architecture
- CS2D-4.2 Perform an installation and configuration of an Oracle database
- CS2D-4.3 Students shall differentiate between ANSI/ISO standards and features of the selected vendor database
- CS2D-4.4 Configure and manage the database storage structures
- CS2D-4.5 Create and administer user accounts
- CS2D-4.6 Perform basic backup and recovery of a database
- CS2D-4.7 Create and implement a plan to manage users and schemas
- CS2D-4.8 Construct and implement a plan for the management of data and concurrency
- CS2D-4.9 Perform administration and monitoring of undo data
- CS2D-4.10 Analyze and monitor performance using administration tools to adjust the database configuration
- CS2D-4.11 Use the database diagnostic monitor

Domain – Business Intelligence, Data Warehousing, and Reporting

Core Standard 5 Students discuss data harvesting and storage as it relates to business intelligence.

Standards

- CS2D-5.1 Explain key concepts and techniques related to business intelligence
- CS2D-5.2 Explain key concepts and techniques related to data warehousing
- CS2D-5.3 Summarize differences between data warehousing, data mining, and BIG data
- CS2D-5.4 Prepare and analyze data to generate information for decision making
- CS2D-5.5 Extract, maintain, summarize, and visualize information
- CS2D-5.6 Explain the societal impacts and ethical dimensions of business intelligence and data warehousing
- CS2D-5.7 Analyze and utilize data trends related to information
- CS2D-5.8 Create reports for business users, including periodic, trending and comparative

CS2D-5.9 Explain the value of business intelligence and data warehousing systems and technologies

CS2D-5.10 Explain data selection for business reporting

Domain – Database Career Pathway

Core Standard 6 Students investigate career pathways related to database.

Standards

CS2D-6.1 Use appropriate technology and resources to research and organize information about careers

CS2D-6.2 Analyze career trends, options and opportunities (outlook) for employment and entrepreneurial endeavors

CS2D-6.3 Evaluate selected careers and pathways for roles and responsibilities, education requirements, working conditions, benefits, and opportunities for growth and change

CS2D-6.4 Demonstrate understanding of postsecondary educational options including technical certificate programs, apprenticeship, military and two- and four-year college programs