COWLEY COLLEGE
& Area Vocational Technical School

COURSE PROCEDURE FOR

DATABASE FUNDAMENTALS
CIS1893 3 Credit Hours

Student Level:
This course is open to students on the college level in either the freshman or sophomore year.

Catalog Description:

CIS 1893 - DATABASE FUNDAMENTALS (3 hrs)
This course gives students the design tools necessary to create effective and efficient databases. Both logical and physical design is covered. Various database management systems are studied. Students will also learn basic SQL. Prerequisite: Basic Computer Skills.

Prerequisites:
Basic Computer Skills

Controlling Purpose:
This course is designed to help the student increase their knowledge concerning various database systems including logical and physical design. Students will also learn basic SQL.

Learner Outcomes:
Upon completion of the course, the student will be able to use a database management system (DBMS) to solve business problems. Students will study data design. Students will develop a general knowledge of database design, development, and administration. Students will learn how to develop a database including tables, queries, forms, and reports. Students will learn how to develop database applications.

Units Outcomes and Criterion Based Evaluation Key for Core Content:
The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:

A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.

B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.

C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.

D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
F = Failing, will be computed in GPA and hours attempted.
N = No instruction or training in this area.

UNIT 1: DATABASE SYSTEMS

Outcomes: After completion of this unit, the student will have a working knowledge of the basic concepts of databases, history of databases, main components and functions of database systems

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain difference between data and information
						Explain the importance of database design
						Explain the role, advantages, and types of databases
						Explain history of file system data processing
						Explain problems with file system data processing
						Explain database systems including environment, functions, and management

UNIT 2: DATA MODELS

Outcomes: After completion of this unit, the student will have a working knowledge of data modeling concepts, the history of data models, and tools to model data.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain data modeling and data models
						Explain the importance of data models
						List and explain the basic building blocks of data models
						Explain how business rules evolve into data model components
						List and explain various data models including hierarchical, relational, entity relationship, object-oriented, object/relational, and XML
						List and explain the degrees of data abstraction including external, conceptual, internal, and physical model

UNIT 3: THE RELATIONAL DATABASE MODEL

Outcomes: After completion of this unit, the student will have a working knowledge of the relational model's logical structure, how to design a relational database, tables, and design considerations.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain the logical view of data
						Explain the role of keys
						Explain integrity rules
						List and explain relational set operators
						Explain the role of the data dictionary and the system catalog
						List and explain the 1:M, 1:1, M:N relationships
						Explain data redundancy
						Explain the role of indexes
						List and explain Codd's relational database rules
						Design a database/tables using keys, relationships, avoiding data redundacy, and indexes.

UNIT 4: ENTITY RELATIONSHIP MODELING

Outcomes: After completion of this unit, the student will have a working knowledge of the main characteristics of entity relationship components, how entities are defined, refined and incorporated into the database design process, and how components affect database design and implementation.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						List and explain all the entities in the entity relationship model (ERM)
						Develop an entity relationship diagram
						Explain database design challenges

UNIT 5: ADVANCED DATA MODELING

Outcomes: After completion of this unit, the student will have a working knowledge of the extended entity relationship model, entity clustering, entity clustering and primary keys.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain the extended entity relationship model
						Explain entity clustering
						Explain entity integrity and the use of primary keys

UNIT 6: NORMALIZATION OF DATABASE TABLES

Outcomes: After completion of this unit, the student will have a working knowledge of normalization, normal forms, transformations from lower to higher normal forms, and denormalization.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain database tables and normalization
						Explain the need for normalization
						List and explain the normalization process
						Explain surrogate key considerations
						Explain higher-level normal forms
						Explain normalization and database design
						Explain denormalization
						Redesign existing tables for normalization
						Design a new database/tables with normalization

UNIT 7: INTRODUCTION TO STRUCTURED QUERY LANGUAGE

Outcomes: After completion of this unit, the student will have a working knowledge of the basic commands and functions of SQL along with some data administration, manipulation, and querying techniques.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain the role of SQL
						Create a database and tables
						Add constraints and indexes
						Add, update, delete, and list table rows
						Insert table rows with a SELECT subquery
						Create SELECT queries using conditional restrictions, arithmetic operators, logical operators, special operators, ordering, unique values, aggregate functions, and grouping
						Create data definition commands
						Create views
						Join database tables

UNIT 8: ADVANCED SQL

Outcomes: After completion of this unit, the student will have a working knowledge of relational set operators, advanced SQL join, subqueries, correlated queries, SQL functions, sequences, views, procedural SQL, and embedded SQL.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Use relational set operators
						Use SQL join operators
						Use subqueries and correlated queries
						Use sql functions
						Use Oracle sequences
						Create updatable views
						Create procedural SQL
						Create embedded SQL

UNIT 9: DATABASE DESIGN

Outcomes: After completion of this unit, the student will have a working knowledge of database design techniques, database design strategies and how to use the life cycles in design.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain the system design life cycle (SDLC)
						Explain the database life cycle (DBLC)
						Explain conceptual design
						List and explain criteria for DBMS selection
						Explain logical design
						Explain physical design
						Explain database design strategies
						Explain centralized vs. decentralized design

UNIT 10: TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL

Outcomes: After completion of this unit, the student will have a working knowledge of database transactions and concurrency .

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain what is a transaction
						Explain concurrency control
						Explain concurrency control with locking methods
						Explain concurrency control with time stamping methods
						Explain concurrency control with optimistic methods
						Explain database recovery management

UNIT 11: DATABASE PERFORMANCE-TUNING AND QUERY OPTIMIZATION

Outcomes: After completion of this unit, the student will have a working knowledge of how to optimize queries and DBMSs.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain database performance-tuning concepts
						Explain query processing
						Explain optimizer choices
						Explain SQL performance tuning
						Performance-tune some query(s)
						Use indexes to improve a query
						Explain query formulation
						Explain DBMS performance tuning

UNIT 12: DISTRIBUTED DATABASE MANAGEMENT SYSTEMS

Outcomes: After completion of this unit, the student will have a working knowledge of distributed database management systems including transaction management and database design considerations.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain the history of distributed database management systems
						List and explain DDBMS advantage and disadvantages
						Explain distributed processing and distributed databases
						List and explain the characteristics of DDBMS
						List and explain the components of DDBMS
						List and explain the levels of data and process distribution
						Explain distributed database transparency features
						Explain distribution transparency
						Explain transaction transparency
						Explain performance transparency and query optimization
						Explain distributed database design
						Explain Client/Server vs. DDBMS

UNIT 13: BUSINESS INTELLIGENCE AND DATA WAREHOUSES

Outcomes: After completion of this unit, the student will have a working knowledge of business intelligence and how it is implemented in data warehouses.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain business intelligence
						Explain business intelligence architecture
						Explain decision support data
						Explain the concept of data warehouses
						Explain online analytical processing
						Explain star schemas
						Create a star schema
						Implement a simple data warehouse
						Explain data mining
						Use SQL extensions for OLAP

UNIT 14: DATABASE CONNECTIVITY AND WEB TECHNOLOGIES

Outcomes: After completion of this unit, the student will have a working knowledge of various database connectivity technologies, web browser plug-ins, SQL data services and how XML is used in web database development.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain database connectivity
						Explain internet databases
						Explain the basics of XML
						Create simple XML
						Explain SQL data services

UNIT 15: DATABASE ADMINISTRATION AND SECURITY Outcomes: After completion of this unit, the student will have a working knowledge of the DBA's roles, security considerations, data dictionary usage, and CASE tools.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain the need for and the role of a database in a corporation
						Explain the DBA's managerial and technical role
						Explain how security needs to be implemented: security policies, security vulnerabilities, and database security
						Use a data dictionary
						Use a CASE tool

Projects Required:
Various database projects

Textbook:
Contact Bookstore for current textbook.

Materials/Equipment Required:
None

Attendance Policy:
Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

Grading Policy:
The grading policy will be outlined by the instructor in the course syllabus.

Maximum class size:
Based on classroom occupancy

Course Timeframe:
The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

Refer to the following policies:

402.00 Academic Code of Conduct
263.00 Student Appeal of Course Grades
403.00 Student Code of Conduct

Disability Services Program:
Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.