

CSC 335: Database System Concepts

Catalog Description:

A study of modern database systems and their underlying concepts. Core topics include the relational model, SQL, database design theory, query processing, file structures, transactions, and concurrency. Programming projects provide practical experience in developing GUI database applications. Public Affairs Capstone Experience course. 3(3-0) S

Prerequisites for this course: "C" or better in CSC 121 or CSC 125 or CSC 131.
This course is a prerequisite for: CSC 450.

Required Text:

Database System Concepts, 6th edition, by Silberschatz, Korth, and Sudarshan

Major Topics (including information for course sequence or transition)

1. SQL (basic operations, set operations, aggregate functions, nested subqueries, join operations, views, transactions, authorization, null values, modification of the database, SQL data types and schemas, accessing SQL from a programming language, triggers, assertions)
2. Relational Algebra (fundamental operations, additional operations, extended operations)
3. Database design and the E-R data model (entity sets, relationship sets, attributes, mapping cardinalities, participation constraints, keys, E-R diagrams, Extended E-R features –generalization, specialization, aggregation–, reduction to relational schemas, E-R design issues)
4. Relational Database Design (features of good designs, normal forms – 1NF, 3NF, BCNF – functional dependencies, Armstrong’s Axioms, closures, canonical covers, decompositions – lossless-join, dependency preservation – , BCNF decomposition algorithm, 3NF decomposition algorithm)
5. Database security (privacy of the data, granting and revoking of privileges, roles, authorization on views, authorization graphs, audit trails)
6. Indexing
7. Transaction management
8. Concurrency control

Student Outcomes Assessed in CSC 335

- A. Students will attain an ability to apply knowledge of computing and mathematics appropriate to the discipline
- B. Students will attain an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- C. Students will attain an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- I. Students will attain an ability to use current techniques, skills, and tools necessary for computing practice

CAC Characteristics Enabled But Not Assessed in CSC 335

- E. Students will attain an understanding of professional, ethical, legal, security and social issues and responsibilities
- G. Students will attain an ability to analyze the local and global impact of computing on individuals, organizations, and society

- J. Students will attain an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices

Table 1. Student Outcomes assessed by CSC 335

CSC 335 Student Outcomes	CSC 335 Performance Indicators	CSC 335 Assessment Goals
CSC 335 contributes to SO A: Students will attain an ability to apply knowledge of computing and mathematics appropriate to the discipline	PI 335-1: HW1 – Writing queries in Relational Algebra. PI 335-2: HW2 – Writing SQL queries PI 335-3: HW3 – Writing advanced SQL queries (outer joins, set containment, scalar subqueries, derived relations, with clause...etc.) PI 335-4: HW4- Writing SQL triggers and assertions	PI 335-1: $\geq 70\%$ correct PI 335-2: $\geq 70\%$ correct PI 335-3: $\geq 70\%$ correct PI 335-4: $\geq 70\%$ correct
CSC 335 contributes to SO B: Students will attain an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution	PI 335-1: HW1 – Writing queries in Relational Algebra. PI 335-2: HW2 – Writing SQL queries PI 335-3: HW3 – Writing advanced SQL queries (outer joins, set containment, scalar subqueries, derived relations, with clause...etc.) PI 335-4: HW4- Writing SQL triggers and assertions	PI 335-1: $\geq 70\%$ correct PI 335-2: $\geq 70\%$ correct PI 335-3: $\geq 70\%$ correct PI 335-4: $\geq 70\%$ correct
CSC 335 contributes to SO C: Students will attain an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs	PI 335-1: HW1 – Recognize problems with a given relation PI 335-5: HW5 – DB design, 3NF, BCNF	PI 335-4: $\geq 70\%$ correct PI 335-5: $\geq 70\%$ correct
CSC 335 contributes to SO I: Students will attain an ability to use current techniques, skills, and tools necessary for computing practice	PI 335-2: HW2 – Writing SQL queries. Students use Oracle database for this assignment.	PI 335-2: $\geq 70\%$ correct

Table 2. CAC Characteristics enabled by CSC 335

CSC 335 CAC Characteristics	CSC 335 Characteristics Enablers
CSC 335 enables Characteristic E: Students will attain an understanding of professional, ethical, legal, security and social issues and responsibilities	The course talks about the importance of keeping the data in the database private. We also discuss database security and the importance of taking care of security at different levels (human, physical, network, database, operating system)
CSC 335 enables Characteristic G: Students will attain an ability to analyze the local and global impact of computing on individuals, organizations, and society	The course talks about the fact that databases are used everywhere. For example, students' data is stored in a database. Many businesses use databases to store information about their

	customers ...etc.
CSC 335 enables Characteristic J: Students will attain an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices	In this course, students study normal forms and the tradeoff between different normal forms (computer science theory). PI 335-5 requires students to give a 3NF and a BCNF decomposition of a given database schema.