

# COMP310 Competencies

## How to Interpret the Competencies

Competencies have four parts to them: knowledge areas, skill-levels, dispositions, and tasks. The task serves as the context in which the other three items are manifest. Below you'll see short task descriptions followed by two tables. The first table lists knowledge areas needed for the task with the accompanying skill levels. Dispositions necessary for the task are listed in the second table. A complete list of knowledge areas can be found after the competencies. Skill-levels are based on Bloom's Taxonomy; you'll find descriptions of each level below the competencies as well.

1. **(Work with Existing Relational DB)** Given a schema for an existing database, work alone or with a team to develop SQL queries to meet a customer's needs. Be able to present the results of the queries to the customer and/or interface those results with the customer's software application requirements.

<u>Knowledge Area</u>	<u>Skill Level</u>
1 - Database Environments	Understanding
3 - SQL	Applying
9a - Analytical and Critical Thinking	Applying
9b - Collaboration and Teamwork	Applying
9d - Mathematics and Statistics	Understanding
9k - Research and Self-Starter/Learner	Applying

<u>Dispositions</u>			
Meticulous	Self-Directed	Collaborative	Adaptable

2. **(Evaluate DB against Requirements)** Given a schema for an existing database, evaluate that database's design against user requirements and present your findings to a technical audience.

<u>Knowledge Area</u>	<u>Skill Level</u>
1 - Database Environments	Applying
2 - Relational Data Model	Evaluating
4 - Database Design	Evaluating
9a - Analytical and Critical Thinking	Applying
9b - Collaboration and Teamwork	Applying
9d - Mathematics and Statistics	Understanding
9k - Research and Self-Starter/Learner	Applying
9f/9m - Oral & Written Communication	Applying

<u>Dispositions</u>			
Meticulous	Self-Directed	Purpose-Driven	Adaptable
Professional	Responsible		

3. **(Design a DB given Requirements)** Given the requirements for a customer or organization, work with a team to design and implement a relational database that meets their needs.

<u>Knowledge Area</u>	<u>Skill Level</u>
1 - Database Environments	Applying
2 - Relational Data Model	Creating
3 - SQL	Applying
4 - Database Design	Creating
9a - Analytical and Critical Thinking	Applying
9b - Collaboration and Teamwork	Applying
9d - Mathematics and Statistics	Understanding
9k - Research and Self-Starter/Learner	Applying
9e - Multi-Task Prioritization and Management	Applying
9l - Time Management	Applying
9j - Relationship Management	Applying

<u>Dispositions</u>			
Meticulous	Self-Directed	Purpose-Driven	Adaptable
Professional	Responsible	Responsive	Inventive

4. **(Sharing a DB)** Work as part of a team to support a non-technical customer/user in their efforts to determine if a database approach to their problem suits their needs and layout the benefits, drawbacks, and requirements of such an approach.

<u>Knowledge Area</u>	<u>Skill Level</u>
1 - Database Environments	Applying
2 - Relational Data Model	Understanding
4 - Database Design	Analyzing
9a - Analytical and Critical Thinking	Applying
9b - Collaboration and Teamwork	Applying
9d - Mathematics and Statistics	Understanding
9k - Research and Self-Starter/Learner	Applying
9f/9m - Oral & Written Communication	Applying
9c - Ethical and Intercultural Perspectives	Applying
9j - Relationship Management	Applying

<u>Dispositions</u>			
Meticulous	Self-Directed	Purpose-Driven	Adaptable
Professional	Responsible	Responsive	

## COMP310 Knowledge Areas

1. Database Environments and DBMSs
  - a. External - Conceptual - Internal ANSI-SPARC Arch.
2. Relational Data Model
  - a. Data Structures
  - b. Integrity Constraints
  - c. Relational Algebra
  - d. Relational Calculus
3. Standard Query Language (SQL)
  - a. Data Manipulation
    - i. Selecting
    - ii. Ordering
    - iii. Grouping
    - iv. Aggregates
    - v. Subqueries
    - vi. Any,all,exists,not exists
    - vii. Joins (Inner,Outer, left, right)
    - viii. Set Operations
  - b. Data Definition
    - i. Data Types and Integrity Constraints
    - ii. Creating and altering tables and indices
    - iii. Creating Views
4. Database Design
  - a. Entity-Relationship Modeling (ER Modeling)
  - b. Relational Database Normalization
  - c. Database Design & Development Methods
5. *Professional Knowledge (Table 4.2 from CC2020 (pg 50))*
  - a. Analytical and Critical Thinking
  - b. Collaboration and Teamwork
  - c. Ethical and Intercultural Perspectives
  - d. Mathematics and Statistics
  - e. Multi-Task Prioritization and Management
  - f. Oral Communication and Presentation
  - g. Problem Solving and Troubleshooting
  - h. Project and Task Organization and Planning
  - i. Quality Assurance / Control
  - j. Relationship Management
  - k. Research and Self-Starter/Learner
  - l. Time Management
  - m. Written Communication

## COMP310 Skills Hierarchy (Bloom's Taxonomy, CC2020 pg 50)

1. *Remembering* - Recall facts, terms, concepts, answers, etc.
2. *Understanding* - Be able to organize, compare, translate, interpret, and give descriptions of facts and ideas
3. *Applying* - Use knowledge, ideas, facts in different ways to solve problems in new situations.
4. *Analyzing* - Make inferences and find evidence to support solutions
5. *Evaluating* - Make judgements about information, validity of ideas, or quality of material
6. *Creating* - Combine elements of information in a new pattern or propose alternative solutions.

## COMP310 Dispositions (From CC2020, pg 51.)

1. Adaptable
2. Collaborative
3. Inventive
4. Meticulous
5. Passionate
6. Proactive
7. Professional
8. Purpose-Driven
9. Responsible
10. Responsive
11. Self-directed

## COMP310 Task Environments

1. Given a pre-designed database, understand its structure and be able to develop SQL queries to that database.
2. Evaluate a relational database design using ER Modeling and Normalization
3. Normalize a Database
4. Design & develop a relational database from high-level requirements using ER modeling and normalization techniques