SYLLABUS

CS727 Relational Database Implementation and Applications

Instructor

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Course Description

In today's data-driven world, the ability to work with relational databases is an essential skill for professionals in various fields. This course is designed to equip you with the knowledge and practical skills needed to become proficient in database management and application development. Whether you are pursuing a career as a database administrator, software developer, or data analyst, this course provides you with a strong foundation to excel in your chosen field.

Course Outcomes

Upon successful completion of this course, you will be able to:

- Describe relational databases and their core components, including tables, rows, columns, and keys.
- Implement relational database and usage of indexes, views, triggers, temporary tables, functions, and stored procedures.
- Describe their role in enforcing business logic and data integrity in database environment.
- Apply database design and SQL knowledge to real-world application development.
- Develop database-driven applications using programming languages, such as Java, Python or C/C++ and frameworks.
- Describe the concepts of indexing and hashing in efficient support for search operations.
- Describe the concepts of transactions and their properties (ACID: Atomicity, Consistency, Isolation, Durability).
- Define concurrency control and understand the impact of uncontrolled concurrent transactions on data integrity.

Course Materials

The link to reading materials and resources to learn the topics can be found in each week's learning module. All materials are available online for free, no required resources need to be purchased. There is no required textbook to supplement the course materials. Note: Be aware that some resources may open in a new tab.

Course Outline

The course consists of 6 modules that focus on the following key areas:

Module 1: Indexes, Views, Functions, and Stored Procedures

Key concepts

- Indexes
- Views
- Functions
- Stored Procedures

Readings

- An Essential Guide to SQL Server Indexes (sqlservertutorial.net)
- MySQL Index - Ultimate Guide to Indexes in MySQL By Practical Examples (mysqltutorial.org)
- MySQL Create View tutorial with examples (mysqltutorial.org)
- MySQL Temporary Table | Create, Use and Drop MySQL Temporary Tables (mysqltutorial.org)
- https://phoenixnap.com/kb/mysql-trigger
- Introduction to Stored Procedure in MySQL (mysqltutorial.org)
- MySQL Stored Function By Practical Examples (mysqltutorial.org)

Module 2: Advanced Window Functions and OLAP Queries in SQL

Key concepts

- Advanced Window Functions and OLAP Queries in SQL

Readings

- Windowing
- OLAP queries in SQL

Module 3: DB Application Development

Key concepts

- Database Application Development

Readings

- DB Application development-link to JDBC: Lesson: JDBC Introduction (The Java™ Tutorials > JDBC Database Access) (oracle.com)
- Python DB connectivity: Jython - JDBC | Tutorialspoint
- C/C++ DB connectivity: Database Connectivity using C C (tutorialspoint.com)
- Video Link: SQL tutorial for beginners: https://youtu.be/7S_tz1z_5bA

Module 4: Indexing and Hashing

Key concepts

- Indexing and Hashing

Readings

- B+ trees
- B+ tree insertion
- B+ tree deletion

Module 5: Transaction Concepts

Key concepts

- Transaction Concepts

Readings

- Transaction Processing Concepts.

Module 6: Concurrency Control

Key concepts

- Concurrency Control

Readings

- Concurrency Control

Course Structure and Learning Activities

There are 6 content modules in this course and each module may take about 5-8 hours to complete. You can advance at your own pace, but it is recommended that you take no longer than a week to complete each module. A consistent pace will help you complete the module and move on to the next course in the sequence. The final module consists of your final exam for the course.

This course is comprised of the following elements:

- **Readings**: Each module may include several required and/or supplemental readings.
- **Video Lessons**: In each module, the concepts you need to know will be presented through a collection of short videos. You may stream these videos for playback within the browser by clicking on their titles.
- **Discussion Forum**: This course has a place for you to interact with other learners about class-related topics. Unless specified, discussion forums do not carry a score.
- **Practice Quizzes**: Each module will include some practice quizzes, intended for you to assess your understanding of the topics. You will be allowed unlimited attempts at each practice quiz. There is no time limit on how long you take to complete each attempt at the quiz. These quizzes do not contribute toward your final score in the class.
- **Summative Module Assessments:** Each module will include at least one summative module assessment. You will be allowed 1 attempt every eight hours for each assessment. There is no time limit on how long you take to complete each attempt at the assessment. Your highest grade will be recorded.
- **Summative Course Assessment:** This course will contain one final summative course assessment. Before taking the exam, please make sure you are in a place with reliable internet connection. No retakes will be granted for the lack of internet access. You are in an online program and the use of the Internet is a requirement.

How to Pass This Course

Guidelines for completing and submitting each assigned course activity is posted along with the assignment. Assignments can be submitted at any time as you move through the module. Only those who complete and submit all assignments, including peer reviews, will receive a certificate of completion of this course. *No late assignments will be accepted.* In case of extenuating circumstances beyond your control that prevent the submission of an assignment or exam, you have to enter a request with the program advisor and the instructor.

To qualify for a Course Certificate, simply start verifying your coursework at the beginning of the course and pay the fee. Coursera Financial Aid is available to offset the registration cost for learners with demonstrated economic needs. If you have questions about Course Certificates, please see the help topics here.

If you choose not to pay the fee, you can still audit the course. You will still be able to view all videos, submit practice quizzes, and view required assessments. Auditing does not include the option to submit required assessments. As such, you will not be able to earn a grade or a Course Certificate.

The following table explains the breakdown for what is required in order to pass the class and qualify for a Course Certificate. You must pass each and every required activity in order to pass this course.

Activity	**Required?**	**Number per Course**	**Estimated Time per Module**	**% Required to Pass**	**% of Total Grade**
Lecture Videos	Yes	3-6 per module	.5-1 hour	N/A	N/A
Practice Quizzes	No	4-7 per module	.5 hour	N/A	N/A
Discussions	No	2 per course	1 hour	N/A	N/A
Summative Module Assessments	Yes	1 per module	.5 hour	80%	10%/each module
Summative Course Assessment	Yes	1 per course	1-3 hours	80%	40%

Getting and Giving Help

- Use the Learner Help Center to find information regarding specific technical problems. For example, technical problems would include error messages, difficulty submitting assignments, or problems with video playback. If you cannot find an answer in the documentation, you can also report your problem to the Coursera staff by clicking on the *Contact Us!* link available on each topic's page within the Learner Help Center.
- Use the flag icon under each item to report errors in lecture video content, assignment questions and

answers, assignment grading, text and links on course pages, or the content of other course materials.
- Familiarize yourself with Coursera's policy on Accessibility.

Academic Integrity

Your attentiveness to academic integrity reflects the value you place on your own work and the work of others. In addition to Coursera's Honor Code, we also have high expectations for conduct during course participation.

Discussion Forums: Expectations

Sharing an online course with other avid learners like you gives you a unique opportunity to share, collaborate, and learn from others and their experiences, and helps you reinforce your understanding of the topics of the course. Interacting in the Discussion Forums is a great way to engage with your online community. We know that it is not possible to read every discussion forum post, so we recommend that you read those that interest you; and reply when you can contribute. The forum is part of your class activities and everybody is expected to act professionally and be civil and respectful of others in your class. Failure to meet these expectations may be considered a break in the Academic Code of Conduct and may result in your removal from the course. Please, check tips and helpful tools to interact in discussion forums in this document.

Academic Code of Conduct

Above all else, learners are expected to ensure that their conduct helps to create an atmosphere conducive to learning and the interchange of knowledge. While it is understood that some of these items are subject to interpretation, learners should nonetheless endeavor to:

- Be respectful of fellow learners.
- Do not discriminate against fellow learners in any manner.
- Conduct peer reviews in a timely manner and give useful feedback on what was done well, helpful suggestions for how to improve, and specific comments about why you gave the grade you chose to assist peers in their learning.
- Turn assignments in on time and follow instructions on all assignments including those affecting the use of technology.
- Be truthful in all communication, which includes, but is not limited to, avoiding academic dishonesty.

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