MET CS 674 - Database Security

Prerequisite: MET CS 669 or proof of knowledge

The course provides a strong foundation in database security and auditing. This course utilizes Oracle scenarios and step-by-step examples. The following topics are covered: security, profiles, password policies, privileges and roles, Virtual Private Databases, and auditing. The course also covers a list of advanced topics, such as SQL injection. Database management security issues such as securing the DBMS, enforcing access controls, and related issues are also covered. A course map is provided below.

Course Objectives

At the completion of the course, you will fully understand how to implement database security on modern business databases by using practical scenarios and step-by-step examples. Hands-on projects using Oracle Database Management System are used to reinforce and showcase the topics presented. Learning objectives for this course are such that you will be able to do the following:

- Understand the fundamentals of security, and how it relates to information systems
- Identify assets in your organization and their values
- Identify risks and vulnerabilities in operating systems from a database perspective
- Learn good password policies, and techniques to secure passwords in your organization
- Learn and implement administration policies for users
- Use Oracle to create policies, profiles and roles
- Understand the various database security models and their advantages or disadvantages
- Learn how to implement a Virtual Private Database using views, roles, and application context
- Gain an overview of auditing fundamentals, and create your own auditing model
- Learn the purpose and use of data dictionaries, encryption and SQL injection
- Explore an interesting topic of your choice related to database security or related topic

Course Outline

Module 1 - Information Security Fundamentals and the Types of Attacks

- Lecture 1 - Information Security Fundamentals
- Lecture 2 - Attackers and their Attacks
- Lecture 3 - Information Security Framework

Module 2 - Operating Systems and User Administration

- Lecture 4 - Operating Systems
- Lecture 5 - User Administration

Module 3 - Profiles, Passwords, Privileges and Roles

Due to a heavy workload in this third week, it is recommended that you get started on the assignments as early as possible (particularly the Research Paper Proposal).

- Lecture 6 - Authorization
- Lecture 7 - Database Applications Security

Module 4 - Virtual Private Database

- Lecture 8 - Virtual Private Database
- Lecture 9 - How the Virtual Private Database Works

Module 5 - Auditing

- Lecture 10 - Auditing

Module 6 - Advanced Topics (Data Dictionary, Encryption with Oracle, and SQL Injection)

- Lecture 11 - Data Dictionary
- Lecture 12 - Encryption with Oracle
- Lecture 13 - SQL Injection

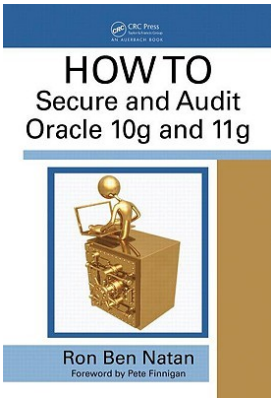
Module 7 - Final Exam

- **Proctored Final Exam** - There will be a proctored final exam for this course.
- **Important Note:** You will not be allowed to bring any material or notes into the proctored facilities and the online lectures will be inaccessible during the entire exam testing period.

Course Resources

Supplemental Source

CS 674 does not have any required textbooks for Fall 2017



Natan, R. B. (2009). ***HOWTO secure and audit Oracle 10g and 11g.*** New York: CRC Press.

ISBN-13: 9781420084122
ISBN-10: 1420084127

This book can be purchased from Barnes and Noble at Boston University.

Tutorials and Handouts

Lab Book Instructions

Link to Audit Handout for Module 5 (available in Module 5, as well)

Advanced SQL Injection In SQL Server Applications (available in Module 6, as well)

SQL Injection: Are your Web Applications Vulnerable? (available in Module 6, as well)

Study Guide

Module 1 Study Guide and Deliverables

Readings:	Online lectures 1–3 *Database Security and Auditing*, Chapter 1 *HOWTO Secure and Audit Oracle 10g and 11g*, Chapters 1 and 2
Discussions:	Discussion 1 postings end Tuesday, September 12 at 6:00 AM ET
Assignments:	Assignment 1 due Tuesday, September 12 at 6:00 AM ET
Assessments:	Quiz 1 due Tuesday, September 12 at 6:00 AM ET

Module 2 Study Guide and Deliverables

Readings:	Online lectures 4 and 5 *Database Security and Auditing*, Chapters 2 and 3
Discussions:	Discussion 2 postings end Tuesday, September 19 at 6:00 AM ET
Assignments:	Assignment 2 due Tuesday, September 19 at 6:00 AM ET

Assessments: Quiz 2 due Tuesday, September 19 at 6:00 AM ET

Module 3 Study Guide and Deliverables

Readings: Online lectures 6 and 7
Database Security and Auditing, Chapter 4
HOWTO Secure and Audit Oracle 10g and 11g, Chapters 4 and 15

Discussions: *Open* Discussion

Assignments: Assignment 3 due Tuesday, September 26 at 6:00 AM ET

Assessments: Quiz 3 due Tuesday, September 26 at 6:00 AM ET

Module 4 Study Guide and Deliverables

Readings: Online lectures 8 and 9
Database Security and Auditing, Chapter 6
HOWTO Secure and Audit Oracle 10g and 11g, Chapter 16

Discussions: Discussion 4 postings end Tuesday, October 3 at 6:00 AM ET

Assignments: Assignment 4 due Tuesday, October 3 by 6:00 AM ET

Assessments: Quiz 4 due Tuesday, October 3 at 6:00 AM ET

Module 5 Study Guide and Deliverables

Readings: Online lecture 10
Auditing handout (Knox, chapter 8)
Database Security and Auditing, Chapters 8 and 9
HOWTO Secure and Audit Oracle 10g and 11g, Chapters 9–12

Discussions: Discussion 5 postings end Tuesday, October 10 at 6:00 AM ET

Assignments: Assignment 5 due Tuesday, October 10 by 6:00 AM ET

Assessments: Quiz 5 due Tuesday, October 10 at 6:00 AM ET

Module 6 Study Guide and Deliverables

Readings: Online lectures 11–13
HOWTO Secure and Audit Oracle 10g and 11g, Chapters 8, and 14 (only sections 14.1 and 14.3)
Scan the two PDF handouts on SQL Injections: Advanced SQL Injection and SQL Injection: Are your Web Applications Vulnerable?

Discussions: Discussion 6 postings end Tuesday, October 17 at 6:00 AM ET

Assignments: Research Paper due Tuesday, October 17 at 6:00 AM ET
Assignment 6 due Tuesday, October 17 by 6:00 AM ET

Assessments: Quiz 6 due Tuesday, October 17 at 6:00 AM ET

Course Grading Structure

The course will be conducted by means of a sequence of lectures in text and graphic form. Each week will cover one or more core database security concepts and will have at least one lab component, along with a short quiz based on the topics covered that week. There is one major assignment: the Research Paper. Students will be able to demonstrate their understanding of the fundamentals of database security through these assignments. In the final module of the course there is a comprehensive final exam, and it is proctored.

Grading Policy

All students will be expected to demonstrate database security knowledge and techniques. To obtain an exceptional grade, you have to exceed expectations in your projects, quizzes, and assignments.

Grading Structure and Distribution

The grade for the course is determined by the following:

Overall Grading Percentages	
Quizzes	15
Labs/Assignment	20
Discussions/Participation	10
Research Paper	25
Proctored Final Examination	30

The following grades will be assigned for your assignments.

A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
Fail	0

Grades will be curved to maintain academic standards at Boston University.

Assignments, Exams and Discussions

Participation

Graded Discussions - all discussions will be graded on a 100-point scale: go to Discussion Rubric

Assignments

Some assignments include hands-on labs. Instructions for submitting your lab work are available by clicking the following link: Lab Book Instructions.

Quizzes

There will be six 30-minute quizzes comprised of a combination of multiple-choice and true/false questions.

Research Paper

You are asked to research and provide a summary report on the latest security features of one of the database management systems, or a Database Security topic, as specified in the Research Paper Details.

Proctored Final Exam

Be aware that there will be a proctored Final Exam for this course. You will be responsible for scheduling your own appointment with an approved proctoring option. Detailed instructions about setting up an appointment will be forthcoming from the proctored exam coordinator.

The Final Exam will consist of multiple-choice and true/false questions. The type and nature of questions in the final exam will be very similar to your quiz questions.

Expectations

Many learning activities require sharing your assignments and opinions with you classmates. For example, you may be given a set of criteria on the basis of which to evaluate other classmates' assignments, and asked to submit the results to your facilitator by a specified day of the week. It is, therefore, very important that you, as well as your classmates, submit your assignments on a timely basis. Timely submission by all will result in each of you being able to evaluate each other's assignments.

Delays

If, for any reason, you are unable to meet any assignment deadline, contact your Course Facilitator. All assignments must be completed. Extensions may be granted under mitigating circumstances.

Discussion Grading Rubric

Graded discussion periods are held Day 1 of each module until 6:00 AM ET on Day 1 of the following module. You're certainly welcome to continue a discussion past the grading period, but that additional posted material will not affect your discussion grade. The discussion grading rubric below is the guide we use to evaluate your discussion contributions.

Discussion Grading Rubric

Criteria	51–60	61–70	71–80	81–90	91–100
Participation	Very limited participation	Participation generally lacks frequency or relevance	Reasonably useful relevant participation during the discussion period	Frequently relevant and consistent participation throughout the discussion period	Continually relevant and consistent participation throughout the discussion period
Community	Mostly indifferent to discussion	Little effort to keep discussions going or provide help	Reasonable effort to respond thoughtfully, provide help, and/or keep discussions going	Often responds thoughtfully in a way that frequently keeps discussions going and provides help	Continually responds thoughtfully in a way that consistently keeps discussions going and provides help
Content	No useful, on-topic, or interesting information, ideas or analysis	Hardly any useful, on-topic, or interesting information, ideas or analysis	Reasonably useful, on-topic, and interesting information, ideas and/or analysis	Frequently useful, on-topic, and interesting information, ideas and analysis	Exceptionally useful, on-topic, and interesting information, ideas and analysis
Reflection and Synthesis	No significant effort to clarify, summarize or synthesize topics raised in discussions			Contributes to group's effort to clarify, summarize or synthesize topics raised in discussions	Leads group's effort to clarify, summarize or synthesize topics raised in discussions

Discussion Information

The discussion threads open at 6:00 AM ET on the first day of the module and close at 6 AM ET on the first day of the next module. They are moderated by your facilitator and are graded unless otherwise noted. Your facilitator may allow you to continue to post after the due date and time but the thread will not be monitored and those additional postings will not count toward your discussion grade. You will receive a grade and feedback for each graded threads. There are general discussions boards, which are not graded, for you to use to discuss any topics with your classmates and facilitators. Please refer to the discussion rubric and netiquette pages before you participate.