Database Security
MET CS 674
On-Campus/Blended

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Course Description

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 advanced topics such as SQL injection, database management security issues such as securing the DBMS, enforcing access controls, and related issues.

Format

This course is presented in the "blended" or "e-Live" format. Thirteen lectures are planned over the course of the semester. Conventional students are expected to attend every lecture. E-Live students are required to attend four 'plenary' sessions. Each lecture, 'plenary' or not, will be videotaped and posted to the course site in BU Blackboard Learn within a few days of the

actual lecture. The lectures will also be 'simulcast' via Zoom for those students who can use it.

Assignments can be downloaded on Blackboard.

Quizzes and the final exam are taken online, through Blackboard.

Course Objectives

The objective we share in this course is that each student understands the application of security concepts to database technology and demonstrate the ability to work hands--on. Specific topic objectives are:

• 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 research topic of your choice related to database security

Prerequisites

You are required to have working knowledge of a programming language or DBMS. It is assumed that you have taken CS579 or CS 669, or have equivalent knowledge. There will be an elementary database quiz at the first session, during class. Please contact the instructor if you use a DBMS at work, or have questions about prerequisites.

Course Texts

Recommended Text

HOWTO Secure and Audit Oracle 10g and 11g by Ron Ben-Natan Publisher: Auerbach Publications; 1 edition (March 10, 2009) ISBN-10: 1420084127 ISBN-13: 978-1420084122

Grading Rubric

Subject mastery and evident hard work are the key things I am seeking in student performance.

Assignments - Go the Extra Mile

The specific instructions for the standard assignments are, to some degree, starting points for your work. If you do only what is on the assignment, your grade will not be 100. You must demonstrate understanding by going above and beyond the assignment. The following will raise your grade to the top levels:

- Discussion of the meaning and use of the steps in the assignment
- Explaining how the steps in the assignment work
- Adding variations in addition to the specified steps of the assignment, for example, an example with a different set of permissions or an additional query to show unexplored aspects of the problem

Category	Weighting
Homework and Labs	20%
Quizzes	20%
Term Project	20%
Final Exam	20%
VPD Project	10%
Class and Online Participation	5%
Term Project Presentation	5%

- Descriptions of tradeoffs in doing the same thing in different ways

Participation Grades

When a student participates in a class discussion I will be looking for the following qualities:

• Applicability to the topic under discussion

• Responsiveness to the points raised by others

• Demonstration of conceptual mastery

• Citation (may be informal) of pertinent materials

VPD Mini-Project Evaluation

The VPD lab is a substantial security project in and of itself. Because of its substantial challenges, completing each step will merit a grade of 75.

Project Evaluation Criteria

The term project must include a word processing document of 2000-3000 words. PowerPoint or other slide decks will not be accepted. Acceptable formats are Word, HTML, PDF. Collections of files, including source code, may be combined into a single ZIP-format file for submission.

The term project should explore or present original material in database security. You may choose your own project topic or choose from a selected topic. We will be discussing project topics in class, after which you will

submit the topic you want to explore. Project topics are subject to instructor approval. The following characteristics will be used to grade the term project:

- Application of basic security concepts to the specific topic
- Demonstrated understanding of technologies involved
- Proper academic formatting including table of contents, abstract,
- Describe methodology
- Comprehensiveness and depth
- Demonstrates technology
- Regulations and standards
- Helpful contrasts
- Coherent
- References in proper format

Not Required in Grading

- Exceptional native intelligence
- Substantial personal experience in topic
- Witty repartée

Late or Missed Work

In case of personal emergency or other circumstances that prevent you from fulfilling an assignment, taking a quiz or test, or attending class, please contact me **before** it is due. Grade penalties for late submission may be waived if you provide this level of notice along with a reasonable and credible explanation. **If an assignment is late, and an extension was not obtained beforehand, 10 points will be deducted for each 24 hour period the assignment is late. Beyond 48 hours past the due date, a score of zero will be assigned.**

- ACADEMIC INTEGRITY
- WRITE IT, OR CITE IT!

Please review the Policy on Academic Conduct: http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/ code.htm

Neither the University, nor I, nor your classmates can tolerate plagiarism in any formal submission for this class. Please show appropriate respect for all by expressing your own mastery of the material in your own words, diagrams, programming, etc. When you include quotations, mark and attribute them clearly and in appropriate academic style. Contact your instructor with any questions.

Schedule (subject to revision)

Bold Letter lectures indicate plenary sessions for which we require in-classroom attendance of e-Live students.
E-Live students are welcome to attend any session of the course in addition to the required plenary session.

Date	Topic
23-Jan-2019 **+ A**	CS 674 Course Introductions
30-Jan-2019	Fundamentals of Information Security
06-Feb-2019	OS Security, DB Hardening, SQL Review
13-Feb-2019	Identifying and Administering Database Users
20-Feb-2019 **+ B**	Authorization - Privileges, Roles, and Models
27-Feb-2019	Application Security Models
06-Mar-2019	Virtual Private Database – Implementation
13-Mar-2019	**NO CLASS**
20-Mar-2019 **+ C**	Virtual Private Database – Discussion and Workshop
27-Mar-2019	Auditing Introduction
03-Apr-2019	Application and Data Auditing
10-Apr-2019	Encryption, SQL Injection, Misc. Advanced Topics (Time permitting)
17-Apr-2019	**NO CLASS – Monday Substitution for Patriot's Day**
24-Apr-2019	Term Project Presentations
01-May-2019 **+ D**	Final Exam Review
08-May-2019	Tentative Final Exam Date (In Class)

IMPORTANT NOTES

We provide a virtual machine appliance for you to use during the course. This can be operated on Windows, Linux, and Macintosh OS X. The operating system internal to the virtual machine is Linux. The virtual machine is run under the free VirtualBox application, download from http://www.virtualbox.org

SNOW POLICY

In the event of school closure, this class will be rescheduled through Zoom. The makeup session will be either the same night, or Saturday morning. We will discuss during the first class.