MET CS 674 – Spring 2011: DATABASE SECURITY

SYLLABUS

Boston University
Boston Campus

Schedule: Monday 18:00-21:00 US Eastern Time
Location: Room B23
Math & Computer Science (MCS)
111 Cummington St
Instructor: Andrew D. Wolfe, Jr., M.S.
Email: awolfe@bu.edu
Office hours: In-person by prior arrangement; time may be available after class. Ad hoc web chats may be possible.

COURSE DESCRIPTION

This is a laboratory course.

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.

OBJECTIVES

The objective we share in this course is that each student understand 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 the requirement has been waived. Please contact the instructor if you use a DBMS at work, or have questions about pre-reqs.

COURSE TEXTS
Required
Database Security and Auditing: Protecting Data Integrity and Accessibility
by Hassan A. Afyouni
Publisher: Course Technology; 1 edition (April 6, 2005)
ISBN-10: 0619215593

Optional
Effective Oracle Database 10g Security by Design
by David C. Knox
Publisher: McGraw-Hill Osborne (Oracle Press)

Readings will be assigned from research papers, articles and journals on database security. There is no need to purchase the research papers – they will be available for download.

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

Overall Grade
The following is the general weighting of grading criteria for this course.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homework and Labs</td>
<td>20 %</td>
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<tr>
<td>Quizzes</td>
<td>20 %</td>
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<tr>
<td>Midterm Exam</td>
<td>15 %</td>
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<tr>
<td>Term Project</td>
<td>20 %</td>
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<td>Final Exam</td>
<td>20 %</td>
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<tr>
<td>Class and Online Participation</td>
<td>5 %</td>
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Participation Grades
When participating 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

**Project Evaluation Criteria**

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 Grade**

- 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 at least THREE HOURS beforehand.

Grade penalties for late submission may be waived if you provide this level of notice along with a reasonable and credible explanation.

Note that failure to deliver any of the required work, including class and/or bulletin-board discussion, may be grounds for course failure.

**ACADEMIC INTEGRITY**

Please review the Policy on Academic Conduct:

[http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.htm](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 (TENTATIVE)

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Date</th>
<th>Topics</th>
<th>Prerequisite reading (Afyouni)</th>
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<tr>
<td>1</td>
<td>01-24</td>
<td>Introductions</td>
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<td>Course Overview</td>
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<tr>
<td>2</td>
<td>01-31</td>
<td>Security Concepts Discussion</td>
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<td></td>
<td></td>
<td>Security Architecture</td>
<td>Chapter 1</td>
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<td>3</td>
<td>02-07</td>
<td>Operating System Security</td>
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<td>Term Project Discussion</td>
<td>Chapter 2</td>
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<td>4</td>
<td>02-14</td>
<td>User Creation and Administration</td>
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<td>5</td>
<td>02-22</td>
<td>Profiles, Passwords, Privileges, and Roles</td>
<td>Chapter 4</td>
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<td>TUESDAY</td>
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<td>6</td>
<td>02-28</td>
<td>Security Models for Database Applications</td>
<td>Chapter 5</td>
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<td>MIDTERM EXAMINATION</td>
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<td>RECESS</td>
<td>03-14</td>
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<td>8</td>
<td>03-21</td>
<td>Virtual Private Databases</td>
<td>Chapter 6</td>
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<td>9</td>
<td>03-28</td>
<td>Database Auditing Models</td>
<td>Chapter 7</td>
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<td>10</td>
<td>04-04</td>
<td>Application and Data Auditing</td>
<td>Chapter 8</td>
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<td>11</td>
<td>04-11</td>
<td>Auditing Database Activities</td>
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<td>04-21</td>
<td>Security and Auditing Project Cases</td>
<td>Chapter 10</td>
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<td>THURSDAY</td>
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<td>13</td>
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<td>Final Review</td>
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<td>15</td>
<td>05-10</td>
<td>FINAL EXAM</td>
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## IMPORTANT NOTES

- The DBMS you use for this course must be Oracle
- The DBMS you use for this course must be available to you at any time you need.
- You will need complete control of the database in order to work on this course because database security is a database administrator level job. This usually means that you should not use an employer's DBMS.