**Boston University MET CS 690**

**Network Security**

## Course Overview

This course will cover advanced network security issues and solutions. The main focus on the first part of the course will be on Security basics, i.e. security services, access controls, vulnerabilities, threats and risk, network architectures and attacks. In the second part of the course, particular focus and emphasis will be given to network security capabilities and mechanisms (Access Control on wire-line and wireless networks), IPsec, Firewalls, Deep Packet Inspection and Transport security. The final portion of the course will address Network Application security (Email, Web, IM, P2P) and Cloud Computing Security. As part of our course review we will explore a number of Network Use Cases.

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## Prerequisites

- MET TC535 or MET CS625 - Data Communications and Computer Networks
- Familiarity with OSI and TCP/IP protocol stack;
- Background-familiarity with binary numbers, prime numbers, binary-hexadecimal-decimal conversions, etc.;
- Familiarity with computer programming concepts.

Strong networking and software background is expected.

## Learning Objectives

At the end of the course, you will be able to understand Advanced Network Security-and security implications on various networking architectures. You will be able to understand the role of security and inter-dependencies of various threats/vulnerabilities and security remedies. You will understand different access control techniques, encryption, firewalls, malware, intrusion detection, network- and application-level security in complex converged services networks.

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## Textbooks Required:

- Charlie Kaufman, Radia Perlman and Mike Speciner, Network Security -- Private Communication in a Public World, 2nd Edition, Prentice-Hall, 2002, ISBN 0-13-046019-2
- Cheswick, William R., Bellovin, Steven M.and Aviel Rubin, *Firewalls and Internet Security: Repelling the Wily Hacker*, Addison-Wesley, 2003, ISBN 0-20-163466-X

## Methods of Instructions

The class sessions will be conducted in the lecture format once a week (see course schedule for possible exceptions). The mandatory components of the course work include class attendance and participation, submitting homework on time, submitting Term Paper on time, presenting Term Paper in class and taking the midterm and final exams.

## Evaluation and Grading

This course is a "learn by doing" course. You will have to do homework assignments to help you master the material. You will also have to read the textbook in advance to prepare for each lecture and to be ready to discuss the issues related to the current class topic.

Any grading event not met and not covered by the above two points will receive a grade of 0

Grades will be based on

- Class attendance (10%),
- Class participation (10%),
- Homework assignments (20%),
- Mid-term (25%),
- Term Paper (5%),
- Term Paper Presentation (5%), and
- Final examination (25%).

Class attendance will proportionally influence the grade.

Grading criteria for class participation, homework and the exams include your ability to understand course concepts and their relationships correctly.

Homework assignments are mandatory. Their timely and satisfactory completion is an absolute requirement for receiving any credit for this course.

Grade ranges are as follows:

| Letter Grade | Numeric Grade |
|---|---|
| A | 94 - 100 |
| A- | 90 - 93 |
| B+ | 87 - 89 |
| B | 84 - 86 |
| B- | 80 - 83 |
| C+ | 77 - 79 |

| | |
|---|---|
| C | 74 - 76 |
| C- | 70 - 73 |
| D | 60 - 69 |
| F | < 60 |

**Homework**

Homework assignments are mandatory. Their timely and satisfactory completion is an absolute requirement for receiving any credit for this course. Homework assignments are required to be submitted via the "Student DropBox" under "Student Tools" within the Blackboard page for this course no later that mid-night of the evening the assignment is due. The url for this course is:

http://blackboard.bu.edu

Use your BU UserId and Kerberos password.

Assignments should be typed, no more than 4 pages in length. Please use a type font no smaller that 12 point Times Roman, 1" margins on all sides. Also ensure that your name in included within the document and also part of the document file name. Word is the preferred file format. Alternatively, .pdf is also acceptable.

Please name your assignment documents in the following format:

CS690-HW-<number>-<student last name>-<student first name>.doc

where:

<number> = 1, 2, 3, etc.

An example assignment file name is:

CS690-HW-5-Smith-John.doc

Please do not use "underscore" (_), but rather "hyphen" (-).

All homework assignments will be posted on the last page of each week's lecture notes along with a due date. Assignments submitted after mid-night of the night that homework is due will have 3 points deducted for each 24 hours late.

There will be two exams, (each 3 hours) that will include: definitions of terms and concepts, and brief discussions of course concepts and their relationships. The exams are open book/notes but no electronic resources allowed.

If either the mid-term or final will be missed it will be the responsibility of the student to arrange with the professor a mutually agreeable schedule for completion of work.

If any work is to be completed beyond the scheduled dates of this course the student must negotiate a Boston University "Contract for an Incomplete Grade" with the professor.

## Labs

No lab work is planned.

## Software

Not applicable beyond basic word processing capabilities.

## Schedule

The class schedule for Fall 2012 MET CS690 is:

| Week | | Subject |
|---|---|---|
| 1 | Sept 10 (Monday) | Introduction: What is Security, Business/Organizational Types, Security Concepts & Goals, Security Process Management and Standards |
| 2 | Sept 17 (Monday) | Foundation Concepts: Security Services, Access Control Concepts, Existing Asset Inventory and Classification, Vulnerabilities, Threats and Risk |
| 3 | Sept 24 (Monday) | Role of Cryptography in Network Security: Cyphers, Role of Cryptography in Information Security, Authentication Systems, Human Authentication |
| 4 | Oct 1 (Monday) | Network Architectures: Architecture Development, Network Security Models, Security Capabilities of Networking Protocols |
| 5 | Oct 8 (Monday) | Holiday - No class |
| 5 | Oct 9 (**Tuesday**) | Network Based Attacks: General Attacks, Attacks on Layers 1 and 2, Network Based Attacks on Layer 3, Network Based Attacks on Layer 4, Network Based Attacks on Applications |
| 6 | Oct 15 (Monday) | Network Element Security: Network Security within Operating Systems and Applications and Network Infrastructure Components |
| **7** | Oct 22 (Monday) | **Midterm Examination** |

| Week | | Subject |
|---|---|---|
| 8 | Oct 29 (Monday) | Network Layers 1 and 2 Security Mechanisms: Media types, 802.1q, 802.1X, 802.11, Sonet, (G)MPLS |
| 9 | Nov 5 (Monday) | Network Layer 3 Protocol Security Mechanism: IPsec and examples |
| 10 | Nov 12 (Monday) | Network Layer 3 Device Security Mechanisms: Packet Filtering (Stateless & Statefull Firewalls, Application Gateways) and Deep Packet Inspection (Intrusion Detection, Intrusion Prevention), Flow Detection |
| 11 | Nov 19 (Monday) | Network Layer 4 Security Mechanisms: TLS, DTLS, SSL, SSH, Malware, Security Certification |
| 12 | Nov 26 (Monday) | Network Application Security, Email Security, Ad-hoc Applications (P-to-P, IM), VoIP Security (SIP-H.323, SRTP, Session Border Controls), XML/SAML and SOA, Multicast Security (Keys and DRM)* |
| 13 | Dec 3 (Monday) | Cloud Computing Security (IaaS, PaaS and SaaS); Completion of topics, project presentations 1st group: 6 students (depends of the number of students) |
| 14 | Dec 10 (Thursday) | Project presentations 2nd group: 6 students (optional, depends on the number of enrolled students) and course overview |
| **15** | Dec 17 (Monday) | **Final Examination** |

**Note that week 5 class will be held on Tuesday!!!**

* Minor adjustments may be made to accommodate interests, discussions, and time.

Weeks 13 and 14 may vary depending on the number of students registered for the class. Also, it is possible that discussions around some topics in the second part of the course may take longer; we will make adjustments in the class.

If more than 12 students are registered, additional adjustments will be made and discussed during the first class.

## Academic Honesty

The course is governed by the Academic Conduct Committee policies regarding plagiarism (any attempt to represent the work of another person as one's own). This includes copying (even with modifications) of a program or segment of code. You can discuss general ideas with other people, but the work you submit must be your own. Collaboration is not permitted.

**Code of Academic Conduct will be strictly enforced, with no exception.**

**The text of the Code of Academic Conduct is posted along with this Syllabus.**

## Instructor Information

Instructor: Dragan Grebovich, CISSP

Office hours: 30 minutes before and 30 minutes after the class and by appointment

Office Address: classroom tbd

E-mail: dragan@bu.edu

**For additional information please visit http://csmet.bu.edu**

**Computer Science Department at Boston University Metropolitan College**