BOSTON UNIVERSITY

COMPUTER SCIENCE DEPARTMENT

Metropolitan College

Network Design and Management

MET CS 685

Instructor:

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COURSE DESCRIPTION

This course will cover contemporary integrated network management based on the FCAPS (Fault, Configuration, Administration, Performance, and Security) management model. Initially the course will provide an overview of data transmission techniques and networking technologies. The course will then focus on Network Management Models, SNMP versions 1, 2 and 3, and MIBs. The remainder of the course will focus on, and emphasize, current network management issues: various wireless networks technologies (WLAN, WiFi, WiMax), Voice-over-IP, Peer-to-Peer Networks, networking services, Identity Management, and Services Oriented Architecture Management.

Prerequisites

- MET TC535 or MET CS625 Data Communications and Computer Networks; Or instructor's permission

Learning Objectives

At the completion of this course, the student should be able to:

- Understand the need for network analysis and how network analysis contributes to the development of user requirements documents and network design
- Explain the elements of structured network design process
- Describe the logical design process for core, distribution, and access networks, and how logical network design processes contribute to the development of User Requirements Documents
- Understand the importance of host and network address allocation and naming plans in the network design processes
- Understand how switching and routing requirements influence network design decisions
- Understand how network security and network management strategies influence network designs
- Describe the elements of the physical design process for access, distribution, and core networks
- Explain how network services allocation and provisioning contribute to network design decisions

Course Materials

There are no required texts for this Course, the following books are recommended references

Recommended Books

Top-Down Network Design, Priscilla Oppenheimer. Third Edition Cisco Press. 2010
ISBN: 978-1-58720-283-4

Network Management Fundamentals, Alexander Clemm. Cisco Press. 2007

 ISBN:978-1-58720-137-0

Network Management Principles and Practice, Mani Subramanian, 2nd Edition, Pearson Education in south Asia, 2012,

ISBN 978-81-317-2759-1

Additional papers, articles and books will be referenced or posted on Blackboard.

Courseware

This course uses Online Campus (Blackboard). Once the course starts all students must use the Online Campus Dashboard internal messages service. Both sections are expected to use Online campus:

- for reading assignments and assigned reading,
- Submitting homework assignments,
- Submitting lab exercises,
- Taking on-line quizzes,
- Participating in discussion threads, and
- Taking the on-line final examination and practice final exam

Class Policies

1) Attendance & Absences

- Students are expected to attend all scheduled on-campus lectures
- Students must notify the instructor in advance if unable to attend any on campus Lecture

2) Assignment, Lab Exercise and Discussion Completion & Late Work

- Homework assignments are mandatory, must be completed and submitted in a timely manner, and are required to be submitted via Online Campus for this course. For each day after the submission date a homework assignment is due will result in a penalty of 3 points. Homework assignments passed in that are over 5 days late will receive a grade of zero (0). If a student will be unable to submit an assignment by its due date, the student must contact the instructor **in advance** to avoid the late submission penalty.

- Lab exercises: are mandatory, must be completed and submitted in a timely manner, and are required to be submitted via Online Campus for this course. For each day after the submission date a lab exercise is due will result in a penalty of 3 points. Lab exercises passed in that are over 5 days late will receive a grade of zero (0). If a student will be unable to submit a Lab exercise by its due date, the student must contact the instructor **in advance** to avoid the late submission penalty.
- Student postings to discussion topic after the listed closing dates will not be counted when calculating a student's discussion grades.

  Academic Conduct Code – Cheating and plagiarism will not be tolerated in any Metropolitan College course. Such activities/behavior will result in no credit for the assignment or examination and may lead to disciplinary actions. Please take the time to review the Student Academic Conduct Code:
  http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html.
  Such activities/behavior includes copying (even with modifications) of another student's work or letting your work to be copied. Your participation in interactions with the instructor and your classmates is encouraged, but the work you submit must be your own.

Assignments

- All homework assignments are identified within the Online Campus Study Guide.
- File names for assignment documents should be:
  CS685-HW<number>-<student last name First Name Initials>.doc
  An example assignment document file name is:
  CS685-HW1-ellabidym.doc

Student submissions which fail to follow this direction will have 5 points deducted!

- Student assignment submissions must be no more than 3 pages in length, be single spaced, use 12 point Times Roman type font and 1" margins on all sides. Student submissions which fail to follow this direction will have points deducted!
  Student submissions which fail to follow this direction will have points deducted!
- Title cover pages are not required and should not be used;
- Assignment submission documents MUST be in Word 2003 or Word 2007 file formats that are NOT encoded in XML;
- Quoted material and citations must follow the American Psychological Association (APA) format with a reference section at the end of a student's submitted work. Please refer to the http://www.apastyle.org/ web site for guidance on following the APA style guide.

- Wikipedia is a useful starting point for finding information about a subject BUT NOT an acceptable direct reference source. One should only reference or quote from primary (source) documents.

Lab Exercises

- Lab exercises are identified within the Assignment description document for each course module.
- File names for lab exercise documents should be:
  CS685-LAB<number>-<student last name first name Initials>.doc
  An example lab exercise document file name is:
  CS685-LAB1-ellabidym.doc

Student submissions which fail to follow this direction will have 5 points deducted!

- Students should enter their lab exercise answers direct within each lab exercise document and then submit the completed document appropriately renamed as stated above;
- Lab exercise submission documents Will be discussed during the first class

Discussion Threads

Each course module includes a discussion topic that students are required to participate in.
Student discussion postings will be graded

Term Project/ Research paper

Students will have the choice of either a final project or a comprehensive research paper.

- A detailed term project description will be posted on blackboard and discussed in class in the next few weeks.

Or

- You can choose a topic related to the course topics or trends in the field of network design and management More details to follow.

Examinations

- Students are required to take five on-line quizzes (one per module) while the course is running.
- Students will be allowed 60 minutes to complete each quiz. A student may take each of these quizzes starting when a quiz becomes available via Online Campus. Each quiz will close at 6 AM ET on the date the next Module starts and not be reopened except for unusual circumstances as decided by the instructor. If a student cannot complete a quiz during the week each quiz is available, the student must make prior arrangements with the instructor.
- On-campus students are required to take a proctored final exam that will be held TBA on TBA and last 3 hours. This exam is open books and open notes.
- If the 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.

Grading Criteria

Students must do homework assignments to help you master the material. You will also must read the online modules, assigned online articles and to be ready to discuss the issues related to the current class topics.

Grades will be based on:
- homework assignments (20%)
- quizzes (20%)
- lab exercises (10%)
- discussion thread participation (10%)
- Project /Research paper (20%)
- proctored final exam (20%)

Grade ranges are as follows:
- 94 <= is an A
- 90 <= and < 94 is an A-
- 87 <= and < 90 is a B+
- 84 <= and < 87 is a B
- 80 <= and < 84 is a B-
- 77 <= and < 80 is a C+
- 74 <= and < 77 is a C
- 70 <= and < 74 is a C-
- 60 <= and < 70 is an F

Academic Conduct Policy

Please visit Metropolitan College's website for the full text of the department's *Academic Conduct Code*.

A Definition of Plagiarism

"The academic counterpart of the bank embezzler and of the manufacturer who mislabels products is the plagiarist: the student or scholar who leads readers to believe that what they are reading is the original

work of the writer when it is not. If it could be assumed that the distinction between plagiarism and honest use of sources is perfectly clear in everyone's mind, there would be no need for the explanation that follows; merely the warning with which this definition concludes would be enough. But it is apparent that sometimes people of goodwill draw the suspicion of guilt upon themselves (and, indeed, are guilty) simply because they are not aware of the illegitimacy of certain kinds of "borrowing" and of the procedures for correct identification of materials other than those gained through independent research and reflection."

"The spectrum is a wide one. At one end there is a word-for-word copying of another's writing without enclosing the copied passage in quotation marks and identifying it in a footnote, both of which are necessary. (This includes, of course, the copying of all or any part of another student's paper.) It hardly seems possible that anyone of college age or more could do that without clear intent to deceive. At the other end there is the almost casual slipping in of a particularly apt term which one has come across in reading and which so aptly expresses one's opinion that one is tempted to make it personal property."

"Between these poles there are degrees and degrees, but they may be roughly placed in two groups. Close to outright and blatant deceit-but more the result, perhaps, of laziness than of bad intent-is the patching together of random jottings made in the course of reading, generally without careful identification of their source, and then woven into the text, so that the result is a mosaic of other people's ideas and words, the writer's sole contribution being the cement to hold the pieces together. Indicative of more effort and, for that reason, somewhat closer to honest, though still dishonest, is the paraphrase, and abbreviated (and often skillfully prepared) restatement of someone else's analysis or conclusion, without acknowledgment that another person's text has been the basis for the recapitulation."

The paragraphs above are from H. Martin and R. Ohmann, *The Logic and Rhetoric of Exposition, Revised Edition.* Copyright 1963, Holt, Rinehart and Winston.

Academic Conduct Code

I. **Philosophy of Discipline**

The objective of Boston University in enforcing academic rules is to promote a community atmosphere in which learning can best take place. Such an atmosphere can be maintained only so long as every student believes that his or her academic competence is being judged fairly and that he or she will not be put at a disadvantage because of someone else's dishonesty. Penalties should be carefully determined so as to be no more and no less than required to maintain the desired atmosphere. In defining violations of this code, the intent is to protect the integrity of the educational process.

II. **Academic Misconduct**

Academic misconduct is conduct by which a student misrepresents his or her academic accomplishments, or impedes other students' opportunities of being judged fairly for their academic work. Knowingly allowing others to represent your work as their own is as serious an offense as submitting another's work as your own.

III. **Violations of this Code**

Violations of this code comprise attempts to be dishonest or deceptive in the performance of academic work in or out of the classroom, alterations of academic records, alterations of official data on paper or electronic resumes, or unauthorized collaboration with another student or students. Violations include, but are not limited to:

A.   **Cheating on examination**. Any attempt by a student to alter his or her performance on an examination in violation of that examination's stated or commonly understood ground rules.

B.   **Plagiarism.** Representing the work of another as one's own. Plagiarism includes but is not limited to the following: copying the answers of another student on an examination, copying or restating the work or ideas of another person or persons in any oral or written work (printed or electronic) without citing the appropriate source, and collaborating with someone else in an academic endeavor without acknowledging his or her contribution. Plagiarism can consist of acts of commission-appropriating the words or ideas of another-or omission failing to acknowledge/document/credit the source or creator of words or ideas (see below for a detailed definition of plagiarism). It also includes colluding with someone else in an academic endeavor without acknowledging his or her contribution, using audio or video footage that comes from another source (including work done by another student) without permission and acknowledgement of that source.

C.   **Misrepresentation or falsification of data** presented for surveys, experiments, reports, etc., which includes but is not limited to: citing authors that do not exist; citing interviews that never took place, or field work that was not completed.

D.   **Theft of an examination**. Stealing or otherwise discovering and/or making known to others the contents of an examination that has not yet been administered.

E.   **Unauthorized communication during examinations**. Any unauthorized communication may be considered prima facie evidence of cheating.

F.   **Knowingly allowing another student to represent your work as his or her own**. This includes providing a copy of your paper or laboratory report to another student without the explicit permission of the instructor(s).

G.   **Forgery, alteration, or knowing misuse of graded examinations, quizzes, grade lists, or official records of documents**, including but not limited to transcripts from any institution, letters of recommendation, degree certificates, examinations, quizzes, or other work after submission.

H.   **Theft or destruction of examinations or papers** after submission.

I.   **Submitting the same work in more than one course** without the consent of instructors.

J.   **Altering or destroying another student's work or records**, altering records of any kind, removing materials from libraries or offices without consent, or in any way interfering with the work of others so as to impede their academic performance.

K.   **Violation of the rules governing teamwork**. Unless the instructor of a course otherwise specifically provides instructions to the contrary, the following rules apply to teamwork: 1. No team member shall intentionally restrict or inhibit another team member's access to team meetings, team work-in-progress, or other team activities without the express authorization of the instructor. 2. All team members shall be held responsible for the content of all teamwork submitted for evaluation as if each team member had individually submitted the entire work product of their team as their own work.

L.   **Failure to sit in a specifically assigned seat during examinations.**

M.   **Conduct in a professional field assignment that violates the policies and regulations of the host school or agency.**

N.   **Conduct in violation of public law occurring outside the University that directly affects the academic and professional status of the student, after civil authorities have imposed sanctions.**

O.   **Attempting improperly to influence the award of any credit, grade, or honor.**

P.   **Intentionally making false statements to the Academic Conduct Committee or intentionally presenting false information to the Committee.**

Q.   **Failure to comply with the sanctions imposed under the authority of this code.**

Disability Services

In accordance with University policy, every effort will be made to accommodate unique and special needs of students with respect to speech, hearing, vision, or other disabilities. Any student who feels he or she may need an accommodation for a documented disability should contact the [Office of Disability Services](#) at (617) 353-3658 or at access@bu.edu for review and approval of accommodation requests.

Netiquette

The Office of Distance Education has produced a netiquette guide to help you understand the potential impact of your communication style.

Before posting to any discussion forum, sending email, or participating in any course or public area, please consider the following:

Ask Yourself…

- How would I say this in a face-to-face classroom or if writing for a newspaper, public blog, or wiki?
- How would I feel if I were the reader?
- How might my comment impact others?
- Am I being respectful?
- Is this the appropriate area or forum to post what I have to say?

Writing

When you are writing, please follow these rules:

- **Stay polite and positive in your communications**. You can and should disagree and participate in discussions with vigor; however, when able, be constructive with your comments.
- **Proofread your comments before you post them.** Remember that your comments are permanent.
- **Pay attention to your tone.** Without the benefit of facial expressions and body language your intended tone or the meaning of the message can be misconstrued.
- **Be thoughtful and remember that classmates' experience levels may vary.** You may want to include background information that is not obvious to all readers.
- **Stay on message.** When adding to existing messages, try to maintain the theme of the comments previously posted. If you want to change the topic, simply start another thread rather than disrupt the current conversation.
- **When appropriate, cite sources.** When referencing the work or opinions of others, make sure to use correct citations.

Reading

When you are reading your peers' communication, consider the following:

- **Respect people's privacy.** Don't assume that information shared with you is public; your peers may not want personal information shared. Please check with them before sharing their information.
- **Be forgiving of other students' and instructors' mistakes.** There are many reasons for typos and misinterpretations. Be gracious and forgive other's mistakes or privately point them out politely.
- **If a comment upsets or offends you, reread it and/or take some time before responding.**

Course Outline
Module 1
Lecture 1 Administrivia Course description and expectation. A quick review of networking OSI and TCP/IP models. Getting to know the business goals as well as its constraint.
Lecture 2 – Foundation concepts: Network design methodologies and design models
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Module 2
Lecture 3 – Concept of network topology design with emphasis on high availability and redundancy. We will address Lan design issues as well as Data Center Design.
Lecture 4 – The need for implementing a logical addressing scheme for the enterprise as well as planning for network expansion and implementation of IPV4 and IPV6 addressing.
Module 3
Lecture 5 – Network design is about making decisions and choices that meets the need of an organization. Network traffic, bandwidth and memory requirement will dictate the type of network devices to use. Switching and routing protocols.
Lecture 6 – Routing protocols will be the topic for this lecture. should we use link state routing or distance victor. Or is it appropriate to use exterior routing protocol. We will be exploring OSPF as well as BGP
Module 4
Lecture 7 –Wan Technologies will get us to understand the design concepts of our enterprise edge and how to connect HQ and satellite offices/branches
Lecture 8 – Designing and implementing a secure remote access infrastructure for the enterprise.
Module 5
Lecture 9 – all modern networks can support data, voice and video. We will explore voice and video design. And test the design
Lecture 10 – The network is built, Now what? Network Management, FCAPS will be discussed and explored
Module 6
Lecture 11 – Identify and explore network management functions, as well as network management architecture
Lecture 12 –SNMP versions 1, 2c and 3 as well as analysis of the its capabilities. MIBs
.
Lecture 13 – Course review.