Network Design and Management

MET CS-685

*L*earn *f*rom *A*nywhere (*LfA*) Course Format, Offered Simultaneously On Campus and Remote

Course Description

MET CS685 – A1

Network Design and Management

Prerequisite : BU MET CS535 or BU MET CS625.

This course will cover network design and management principles as you complete a network design spanning from LAN – through MAN to WAN. The beginning of the course will be an in-depth understanding of customer needs and requirements gathering, followed by a review of data transmission techniques, and continuing with networking technologies with a focus on the Network Management Models, SNMP versions 1, 2 and 3, and MIBs. Your design will focus on a large scale deployment of a Content Delivery Network that offers Video, Voice and Data Services. Emphasis will be placed on current network management issues, and how to incorporate various wireless networks technologies (WLAN, WiFi) into your design.

Course Overview

This course begins with the focus on understanding and performing solid requirements gathering, so that you may accurately specify and detail your requirements while avoiding "scope creep" in your network design. An appreciation and understanding of how your network will be used is a key factor before you can even think of designing it. From there you will need to evaluate the technologies available to you, and how best to select them based upon where the needs are in the network, TCP/IP, SONET, and Wavelength Services will be part of your design, along with WiFi and cellular components. Proper specification of Switch, Router, and Add/Drop Multiplexer (ADM) equipment will also be incorporated into your design. This will also include writing an applicable RFP to go with your design, as with the documented implementation of your selections; IP assignment, VLAN design, Protection Schema, etc.

At the completion of this class you will be able design, specify, and implement a modern, large scale network design using the latest technology and devices, while understanding how to secure your network and detail sufficient Operations, Administration, Management, Provisioning, (OAM&P) requirements for your Element Management System (EMS).

Course Objectives

The course will enable you to:

- Understand the role of a network designer
- Understand the major application architectures and applicable standards
- Be familiar with the different types of network circuits and media, as well as understand how analog/digital data is transmitted with analog/digital signals
- Understand the need for network analysis
- Understand the elements of structured network design process
- Implement the logical design process for core, distribution, and access networks
- Detail how switching and routing requirements influence network design
- Understand how network monitoring, alarm reporting influence network designs
- Be able to detail the physical design process of device, infrastructure and protocol selection
- Know how technical proposals are developed and presented to senior executives
- Understand LAN and WLAN technologies and be able to design a LAN and a WLAN
- Understand enterprise wide technologies, including backbones, Ethernet, Optical
- Understand VLAN implementation and design
- Understand the overall design of the Internet and access technologies
- Understand network security, design, and management issues

Learning Outcomes

By successfully completing this course you will be able to:

- Use and understand networking terminology
- Be able to design a complete network from LAN through WAN
- Choose a networking technology suitable to solve a business problem
- Be able to design and implement network services
- Apply network and security management techniques
- Understand and evaluate new networking technologies

Instructor

Scot Arena

Senior Lecturer

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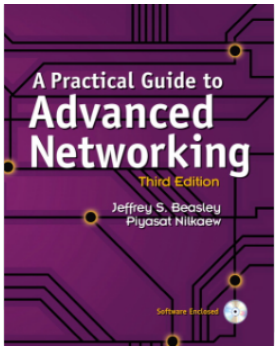
Office Hours : by appointment / Virtual

The best way to reach me outside of our class sessions is to email me at my BU email address. I normally pick up my course and regular emails many times per day.

Course Materials and Resources

Required Course Materials



A Practical Guide to Advanced Networking (paperback), 3rd Edition

Jeffrey S. Beasley, New Mexico State University

Piyasat Nilkaew

Courseware : Blackboard, Zoom, and various posted lecture material posted through the class site will be used this semester.

Fall 2020 Covid Policies

Classroom Rotations: [*for courses with rooms that cannot accommodate the all students wanting to meet in-person*] Classrooms on campus have new capacities that follow guidelines issued by state and local health and government authorities related to COVID-19 and physical distancing. Before the beginning of the class, and throughout the semester, I will be reaching out to students who have indicated that they want to attend the classroom in-person. Our classrooms hold [17] students, and therefore either section *may* have [two] rotations of students that come to class on campus alternate weeks. You will be asked to attend remotely on the week that you have rotated out the classroom.

Compliance: All students returning to campus will be required, through a digital agreement, to commit to a set of Health Commitments and Expectations including face coverings, symptom attestation, testing, contact tracing, quarantine, and isolation. The agreement makes clear that compliance is a condition of being a member of our on-campus community.

You have a critical role to play in minimizing transmission of COVID-19 within the University community, so the University is requiring that you make your own health and safety commitments. Additionally, if you will be attending this class in person, you will be asked to show your Healthway badge on your mobile device to the instructor in the classroom prior to starting

class, and wear your face mask over your mouth and nose at all times. If you do not comply with these rules you will be asked to leave the classroom. If you refuse to leave the class, the instructor will inform the class that they will not proceed with instruction until you leave the room. If you still refuse to leave the room, the instructor will dismiss the class and will contact the academic Dean's office for follow up.

Boston University is committed to offering the best learning environment for you, but to succeed, we need your help. We all must be responsible and respectful. If you do not want to follow these guidelines, you must participate in class remotely, so that you do not put your classmates or others at undue risk. We are counting on all members of our community to be courteous and collegial, whether they are with classmates and colleagues on campus, in the classroom, or engaging with us remotely, as we work together this fall semester.

Academic Conduct Code

1) **All Students will be required to read and accept the Boston University Metropolitan College Graduate Student Academic Conduct Code Agreement.**
2) ***This must be accepted prior to the course material becoming available in the class site.***
3) Please note: Cheating and plagiarism will not be tolerated in any Metropolitan College course. They will result in no credit for the assignment or examination and may lead to disciplinary actions. Thus you should take the time to review the Student Academic Conduct Code and not just "click" that you accept it.
4) Any / All of your course deliverables may be verified through Turnitin or SafeAssign utilities to assure that your work does not include an excessive amount of non-original work. You should put everything in your own words to exemplify that you understand the material being covered.
5) Using sites such as CourseHero are a direct violation of the Boston University Code of Academic Conduct, and doing so may result in disciplinary action.

   http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html.

   NOTE: This should not be understood as a discouragement for discussing the material or your particular approach to a problem with other students in the class. On the contrary – you should share your thoughts, questions and solutions. Naturally, if you choose to work in a group, you will be expected to come up with more than one and highly original solutions rather than the same mistakes.

Boston University Library Information

Boston University has created a set of videos to help orient you to the online resources at your disposal. An introduction to the series is below: { click on the embedded link }

All of the videos in the series are available on the Online Library Resources page, which is also accessible from the Campus Bookmarks section of your Online Campus Dashboard. Please feel free to make use of them.

As Boston University students, you have full access to the BU Library. From any computer, you can gain access to anything at the library that is electronically formatted. To connect to the library, use the link http://www.bu.edu/library. You may use the library's content whether you are connected through your online course or not, by confirming your status as a BU community member using your Kerberos password.

Once in the library system, you can use the links under "Resources" and "Collections" to find databases, eJournals, and eBooks, as well as search the library by subject. Some other useful links follow:

Go to http://www.bu.edu/library/research/collections to access eBooks and eJournals directly.

If you have questions about library resources, go to http://www.bu.edu/library/help/ask-a-librarian to email the library or use the live-chat feature.

To locate course eReserves, go to http://www.bu.edu/library/services/reserves.

Please note that you are not to post attachments of the required or other readings in the water cooler or other areas of the course, as it is an infringement on copyright laws and department policy. All students have access to the library system and will need to develop research skills that include how to find articles through library systems and databases.

Study Guide

The following material is collected here for your convenience.

Module 1 Study Guide and Deliverables

Topic: Identifying Customer Needs and Goals. Requirements Gathering Phase and Approach.

Assignments: Discussion 1 and 2, Assignment , 1 and Lab 1

Refer to Calendar for Due Dates

Assessments: Quiz 1 ***Refer to Calendar for Due Dates***

Module 2 Study Guide and Deliverables

Topic: Logical Network Design

Assignments: Discussion 3 and 4, Assignment 2 and Lab 2

Refer to Calendar for Due Dates

Assessments: Quiz 2 ***Refer to Calendar for Due Dates***

Module 3 Study Guide and Deliverables

Topic: Selecting Technologies

Assignments: Discussion 5 and 6, Assignment 3 and Lab 3

Refer to Calendar for Due Dates

Assessments: Quiz 3 ***Refer to Calendar for Due Dates***

Module 4 Study Guide and Deliverables

Topic: Physical Layer Service and Selection

Assignments: Discussion 7 and 8, Assignment 4 and Lab 4

Refer to Calendar for Due Dates

Assessments: Quiz 4 ***Refer to Calendar for Due Dates***

Module 5 Study Guide and Deliverables

Topic: Network Management

Assignments: Discussion 9 and 10, Assignment 5 and Lab 5

Refer to Calendar for Due Dates

Assessments: Quiz 5 due ***Refer to Calendar for Due Dates { if assigned }***

Module 6 Study Guide and Deliverables

Topic: Performance Management

Assignments: Discussion 11

Combined with Module-5 Assignments.

Refer to Calendar for Due Dates

Final Exam Details

The Computer Science department requires that all final exams in the program be proctored either via Zoom meetings with your Camera on or in person. The Final Exam in this course will be held on the last evening of class : **Refer to the Class Site for the Applicable Date.**

The final exam is planned as a two hour, comprehensive presentation covering the material from the entire course. The exam can only be presented during the scheduled final exam period. Students will present their design and selection to the instructor, who may also invite other faculty personnel and / or industry professionals to review the presentation.

During the final exam the Team must exemplify mastery of their design and selections during their presentation. Each team member must participate in order to receive full credit for the exam.

Course Grading Information

Course Structure

The course is organized as a sequence of six main modules. Each of the six modules will include textbook readings and assignments from the course text. All of the modules *may* also include graded labs, and quizzes.

Grade Weighting

The following table summarizes the six kinds of graded items and the default percentage of grades determined by each of these items. Each of these graded items is explained below.

note: Since this is a group team design project, the detailed grading structure by will be explained in class. If you have any questions you should address them directly with your instructor. The table below is a reference and the weights may be adjusted by the instructor, you should reference the Blackboard site for updates and accuracy.

Reference - Base Grading Distribution	
Deliverable	**Weight**
Discussion / Participation	10%
Mid-Term / RFP	20%
Quizzes	10%
Homework Assignments	25%

Final Exam / Design	20%
Presentation / Selection	15%
TOTAL	**100%**

Concepts Assignments / Homework

As we progress through the semester you will complete concepts assignments / Homework that help you and your team solidify the concepts you have read in the textbook and online lectures. In order to obtain full credit, you will present your homework assignments to the class, and they must NOT be simply cut and paste from the class text or any other resources. Due to the required timing of the Homework Assignments, **No assignment will be accepted late for credit.**

Note: No Assignment will be accepted which has a SafeAssign score greater than 20%

If anything is submitted with a score that exceeds this, it will be overridden as a zero for the submission. No Exceptions.

Labs

In the spirit of "traditional" network design classes, select labs will be assigned throughout the semester from the course text, these will be selected each with a minimum of two weeks time to complete as the semester progresses, **No deliverable will be accepted late for credit.**

Discussion

Weekly Discussion forums will be assigned in the class Blackboard site. The format is that you will be given a topic and you have by Wednesday at midnight to post your original post. Then by Saturday of the same week you need to comment to a minimum of Three (3) peer postings. Your peer postings should be in dialogue form, not just a single sentence in order for full credit. **No discussion will be accepted late for credit.**

Mid-Term / RFP

The class will work as a Team throughout the semester with each student taking equal parts to design, and reply to a large scale RFP for a complete network design and selection. The Mid-Term will be the RFP delivery time frame whereby the Team will do a presentation of their combined RFP effort which will be graded as the Mid-Term exam. Each team member must participate equally to the effort in order to obtain full-credit.

Quizzes

There is generally one graded quiz for each of the modules, As the timing permits there will be a minimum of four up to six quizzes. The results for your quiz will be released as soon as possible after the quiz closes. When the quizzes are released you will be able to see the questions, your answers, the correct answers. Quizzes will be open for a minimum of five (5) days in which you must select an opportune time for you to dedicate seventy (70) minutes. Once a quiz is started, it cannot be paused, therefore you need to select ample time during the window. Due to the availability of the Quizzes with a five day window, **No Quizzes will be accepted late for credit.**

Note: if you experience technical difficulties while taking a quiz you should email the instructor immediately stating the issue and your quiz will be reset.

The Final Exam / Design

Your final exam will be offered in the last week of the course. You final exam will be a presentation of the Team design and selections. **Note:** *The LfA Fall 2020 final Exam may be held via a Zoom Class meeting whereby every student will be Required to have their webcam on and participate in the Team Presentation. The intent of the final exam is to evaluate your mastery of the course material, so that if you learn the* course material well, you will do well on the final exam.

If for some reason you cannot take the exam on the scheduled evening, you must notify the Instructor and Team Members as soon as this is know, and alternate arrangements may be made for you to come on campus / or complete the exam - **before** the scheduled exam date. If you cannot take it when required you should opt to take an Incomplete and take it as soon as possible thereafter.

Note that your overall final exam score will be based on the team effort and presentation. All members must contribute equally in order to attain full credit for the exam.

Presentation / Selection

The Final Design will also incorporate a Selection criteria that will give you the opportunity to chose current vendor equipment based upon your design requirements. This will be a combined presentation with your final exam, and Each team member must participate equally to the effort in order to obtain full-credit. While this is a combined presentation, the selection criteria will be graded separately in order to not place too much weight on any single component of the class.

Grading Structure

Your assignments, quizzes, term project, and final exam will be graded on a percentage basis. The following table summarizes typical correspondence of percentage grades and letter grades for individual graded items.

Grade Scale for class below :

Letter Grade	Honor Points	Decimal Range
A	4.0	95 +
A-	3.7	91 - 94
B+	3.3	88 - 90
B	3.0	84 - 87
B-	2.7	81 - 83
C+	2.3	78 - 80
C	2.0	74 - 77
C-	1.7	71 - 73
D	1.0	68 - 70
F	0.0	Below 67

The decimal range shows whole numbers, actual is always From X.00 to Y.99 (i.e. 91.00 – 94.99)

Note that C is the **lowest** grade that satisfies degree requirements in graduate courses, and that you need to maintain a grade point average of 3.0 or better to graduate. For more information, see the MSCIS Academic Policies online manual.

The percentage ranges above are approximate. Your letter grade is determined by your professor as the best overall measure of how well you have demonstrated that you understand the material, taking

into separate consideration your performance in the quizzes, assignments, term project, and final exam. Additional grading criteria include any substantial difference in your performance on the proctored final exam and the general trend of your scores over the term.

Lateness

We recognize that emergencies and unexpected but significant extensions in work hours occur in professional and personal lives. If one occurs that prevents your completion of a course item by a deadline, please make this plain to your instructor. This must be done well in advance of the deadline (unless it is an emergency that makes this impossible, of course), and should be accompanied by particulars that back it up. Additional documentation may be requested. If this is permitted at the discretion of the instructor, a minimum of Twenty points will otherwise be deducted for late submissions on a per day basis: we want to be fair to everyone in this process, including the vast majority of you who sacrifice so much to submit your homework on time in this demanding schedule.

Quiz Instructions

You will have access to the quiz on the Sunday of the week that they are assigned. (re: the course calendar for the assigned weeks) The quiz closes at midnight of the assigned date, (i.e. Sunday - Friday) If you are going to miss the deadline for any reason you should contact your facilitator and instructor Prior to the Quiz Window. **No Quizzes will be accepted after the assigned due date**.

Quiz Details

- You can access the quiz details from the assessments menu.
- You will have **70 minutes** to complete the quiz. If you should exit the quiz and re-enter at a later time **the clock is still running** during the time you had left the quiz.
- Each quiz has 20 choose-multiple and multiple-choice questions.
- There is a 21st question (worth 0 points) where you may optionally provide comments. These comments will be reviewed by your Instructor and considered when the quiz is graded. This is an opportunity for you to let us know if you feel that a certain question or answer had some ambiguity, or you want to clarify your choice for a certain question.
- Not every student will have the same identical quiz questions.

- The quiz is generated for each student from a question pool.
- The order of all questions and answers is randomized.
- The points for each question are shown.
- The quiz questions will display one at a time on your screen.
- You may skip over questions and revisit them in any order.

Also note:

- **You can take each quiz only once.** Even if the quiz shows multiple attempts, **you should NOT proceed to any subsequent attempt without first checking with your instructor. There are no exceptions to this regardless of the circumstances.**
- You will be able to continue to save answers to questions after the time has expired, but any late answers will be time stamped and marked as late. This will allow us to grade your quiz fairly in the event that technical difficulties occur while you take your quiz.
- Click only the radio button/check box to choose an answer. Clicking in white space around the question choice can sometimes select that choice.

How to Handle Technical Difficulties

If you experience technical issues with your quiz, sometimes you will be able to continue simply by reconnecting to Blackboard and then continuing. However, if you cannot simply reconnect and continue with your quiz. (i.e. the state is changed to "submitted", etc.) then you should notify your Instructor noting the circumstances and time of the issue. In most cases this will result in the Instructor resetting your quiz, whereby you will need to take it again in completion. Most times it is not possible to reset and preserve prior responses.

If this does happen an exception may be given that allows you to retake the quiz even if the window has expired.

Note: if you are experiencing issues with the site access to a quiz, then you should contact eLive elivesvc@bu.edu and copy your instructor and facilitator as well.

Saving Answers

- To answer a multiple choice question, select the appropriate choice from the list below the question.
- When you have completed your response, click "Save Answer" at the top of the question.
- As you proceed through the exam, you can go back and edit previous responses that you saved.
- A timer is displayed above the questions tracking the remaining time available.
- You will see question number buttons above questions. You will need to click on "Question Completion Status" to see the question numbers. You can use these buttons to navigate from question to question at any time.
- When you have completed all answers, go to the last question of the exam and click the "Save and Submit" button.

Other Questions

If you have any questions about the quiz please feel free to contact your facilitator and / Or Instructor. Not all classes have Facilitators, and this should be simply to contact your instructor.

Technical Support

Assistance with course-related technical problems is provided by the IS&T Help Center. To ensure the fastest possible response, please fill out the online form using the link below.

IT Help Center Support	
Email	ithelp@bu.edu Please use "BB Learn Question" in the subject line
Web	http://www.bu.edu/tech/web/course-sites/blackboard-learn/
Phone	(888) 243-4596