

Syllabus

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Description

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MET CS 685

Network Design and Management

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).

Technical Notes

The table of contents expands and contracts (+/- sign) and may conceal some pages. To avoid missing content pages, you are advised to use the next/previous page icons in the top right corner of the learning modules.

This course requires you to access files such as word documents, PDFs, and/or media files. These files may open in your browser or be downloaded as files, depending on the settings of your browser.

Learning Objectives

By successfully completing this course, you will be able to do the following:

1. Assess the need for good Requirements to enable an in-depth network design.
2. Design a complete network from LAN through MAN and WAN.
3. Choose a networking technology suitable to solve a business problem.
4. Design and implement network services.
5. Apply network and security management techniques.
6. Evaluate new networking technologies.

Instructor

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Scot Arena is a Sr. Lecturer in Boston University MET College's Computer Science Department, and is currently the department's Networking Curriculum coordinator.

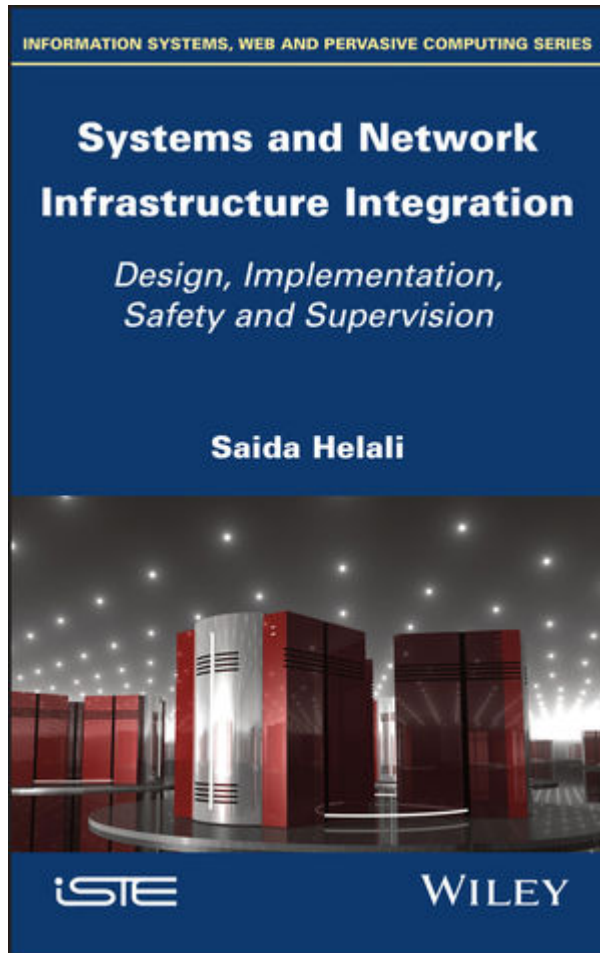
Prior to joining BU full time, Scot spent 38 years in the R&D field of Telecommunications where he worked at AT&T/Lucent Bell Labs, and Verizon Labs. He holds several Patents in the areas of Networking, Fiber Optics, and Security, and has worked on numerous large scale network architectures ranging from the first fiber optic systems through the deployment of the Verizon FiOS network. Prior to joining BU full time, he had been teaching in the CS department part time since 1996.

Materials

Required Book

Saida Helali (2020)

Systems and Network Infrastructure Integration: Design, Implementation, Safety and Supervision.



Publisher: Wiley.

ISBN: 978-1-786-30526-8

This book can be purchased from [Barnes and Noble at Boston University](#).

Reference Book

Note: in module lectures, some graphs and content refer to the book “Oppenheimer”. The book is *Top-Down Network Design*, 3rd Edition, by Priscilla Oppenheimer.

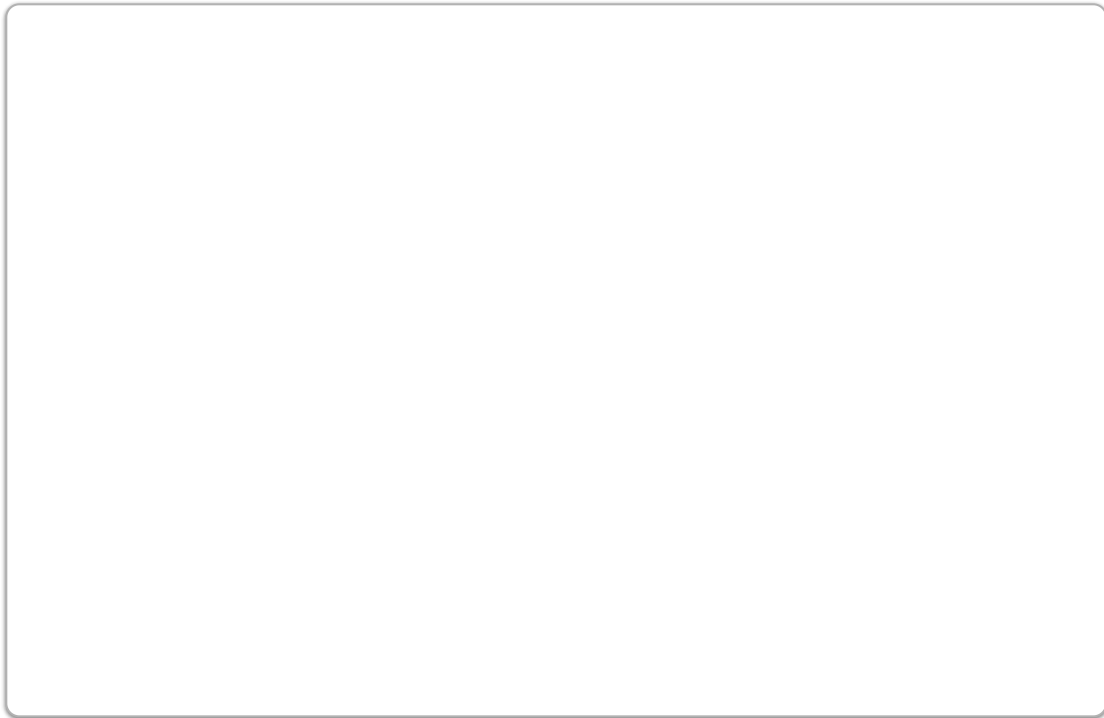
IEEE Standards

- [RFC 6632 IETF Network Management](#)
- [RFC 7276 Operations Administration and Maintenance \(OAM\)](#)
 - IETF overview of Operations, Administration, and Maintenance (OAM) Tools
- [RFC 1933 Transition from IPv4 to IPv6](#) (Transition from IPv4 to IPv6)
- [RFC 7950 The Yang Data 1.1 Data Model](#) (The Yang 1.1 Data Model Language, August 2016)
- [RFC 6020 Yang – A Data Modeling Language for the Network Configuration Protocol \(NETCONF\)](#)
- [RFC 6241 Network Configuration Protocol \(NETCONF\)](#)
- [RFC 5424 The Syslog Protocol](#)
 - The Syslog Protocol.
 - There are many other RFCs that have been issued to enhance Syslog processing.
 - This is the base Syslog, you can find specific RFCs to detail different implementations.

- [Toward a Network Telemetry Framework draft-song-ntf-02](#) (not official RFC)
- [RFC 7923 Subscription to Yang Datastores](#)
 - Requirements for Subscription to YANG Datastores

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:



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 [Collections](#) to access eBooks and eJournals directly.

If you have questions about library resources, go to [Ask A Librarian](#) to email the library or use the live-chat feature.

To locate course eReserves, go to [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

Module 1 Study Guide and Deliverables

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

Readings:

- Text Chapters 1 and 2
- Lecture material

Discussions: Discussion 1

- Post your original responses by Thursday, March 17, at 6:00 AM ET
- Read postings from peers and choose three posts to ask questions and offer constructive feedback, by Saturday, March 19, at 6:00 AM ET
- To keep conversations going, respond to questions asked and feedback offered by your classmates or your instructor on your own post, Sunday, March 20, at 6:00 AM ET

Access at "Class Discussion" on the left-hand course menu.

Assignments:

- Assignment 1 due Wednesday, March 23, at 6:00 AM ET

Submit at "Assignments" on the left-hand course menu.

Assessments:

- Quiz 1 due Saturday, March 26, at 6:00 AM ET

Attempt the quiz at "Assessments" on the left-hand course menu.

Module 2 Study Guide and Deliverables

Topic: Logical Network Design

Readings:

- Text Chapters 3 and 4
- Lecture material

Discussions: Discussion 2

- Post your original responses by Thursday, March 24, at 6:00 AM ET
- Read postings from peers and choose three posts to ask questions and offer constructive feedback, by Saturday, March 26, at 6:00 AM ET
- Respond to questions asked and feedback offered by your classmates or your instructor on your own post, Sunday, March 27, at 6:00 AM ET

Access at “Class Discussion” on the left-hand course menu.

Assignments: • Assignment 2 due Wednesday, March 30, at 6:00 AM ET

Submit at “Assignments” on the left-hand course menu.

Assessments: • Quiz 2 due Saturday, April 2, at 6:00 AM ET

Attempt the quiz at “Assessments” on the left-hand course menu.

Module 3 Study Guide and Deliverables

Topic: Selecting Technologies

- Readings:**
- Text Chapters 3 and 4
 - Lecture material

Discussions: Discussion 3

- Post your original responses by Thursday, March 31, at 6:00 AM ET
- Read postings from peers and choose three posts to ask questions and offer constructive feedback, by Saturday, April 2, at 6:00 AM ET
- To keep conversations going, respond to questions asked and feedback offered by your classmates or your instructor on your own post, Sunday, April 3, at 6:00 AM ET

- Assignments:**
- Assignment 3 due Wednesday, April 6, at 6:00 AM ET
 - Mid-Term/RFP due Friday, April 8, at 6:00 AM ET

Assessments: Quiz 3 due Saturday, April 9, at 6:00 AM ET

Module 4 Study Guide and Deliverables

Topic: Physical Layer Service and Selection

- Readings:
- Text Chapters 5 and 7
 - Lecture material

Discussions: Discussion 4

- Post your original responses by Thursday, April 7, at 6:00 AM ET
- Read postings from peers and choose three posts to ask questions and offer constructive feedback, by Saturday, April 9, at 6:00 AM ET
- To keep conversations going, respond to questions asked and feedback offered by your classmates or your instructor on your own post, Sunday, April 10, at 6:00 AM ET

Assignments: Assignment 4 due Wednesday, April 13, at 6:00 AM ET

Assessments: Quiz 4 due Saturday, April 16, at 6:00 AM ET

Module 5 Study Guide and Deliverables

Topic: Network Management

- Readings:
- Text Chapters 8 and 9
 - Lecture material

Discussions: Discussion 5

- Post your original responses by Thursday, April 14, at 6:00 AM ET
- Read postings from peers and choose three posts to ask questions and offer constructive feedback, by Saturday, April 16, at 6:00 AM ET
- To keep conversations going, respond to questions asked and feedback offered by your classmates or your instructor on your own post, Sunday, April 17, at 6:00 AM ET

Assignments: Assignment 5 due Wednesday, April 20, at 6:00 AM ET

Assessments: Quiz 5 due Saturday, April 23, at 6:00 AM ET

Module 6 Study Guide and Deliverables

Topic: Network Performance

- Readings:
- Text Chapters
 - Lecture material

Discussions: Discussion 6

- Post your original responses by Thursday, April 21, at 6:00 AM ET
- Read postings from peers and choose three posts to ask questions and offer constructive feedback, by Saturday, April 23, at 6:00 AM ET
- To keep conversations going, respond to questions asked and feedback offered by your classmates or your instructor on your own post, Sunday, April 24, at 6:00 AM ET

- Assignments:
- Final Design due Monday, April 25, at 6:00 AM ET
 - Assignment 6 due Wednesday, April 27, at 6:00 AM ET

Assessments: No Quiz

Course Evaluation: Course Evaluation opens on Monday, April 18, at 10:00 AM ET and closes on Monday, April 25, at 11:59 PM ET.

Please complete the course evaluation. Your feedback is important to MET, as it helps us make improvements to the program and the course for future students

Grading Information

The final grade for the course will be determined as follows:

| | |
|-----------------------------|------|
| Discussion/Participation: | 10% |
| Request For Proposal (RFP): | 20% |
| Five Quizzes: | 20% |
| Concepts Assignments: | 15% |
| Final Project | 15% |
| Final Exam: | 20% |
| Total | 100% |

Discussion/Participation

- In weekly discussion forums, you will be given a topic and you have by Thursday at 6:00 AM ET to post your original post.
- Then by Saturday at 6:00 AM ET 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.
- To keep conversations going, respond to questions asked and feedback offered by your classmates or your instructor on your own post, by Sunday, at 6:00 AM ET.
- Access at “Class Discussion” on the left-hand course menu.
- No discussion or postings will be accepted late for credit.

Request For Proposal (RFP)

The class will work in Team(s) throughout the semester with each student taking equal parts to formulate, and a large scale RFP, which could be used as the basis of a complete network design and selection. The Mid-semester deliverable will be the RFP whereby the Team(s) will do a presentation of their combined RFP effort which will be graded in lieu of a Mid-Term exam. Each team member must participate equally to the effort in order to obtain full-credit.

Submit at “Assignments” on the left-hand course menu.

Quizzes

There is one graded quiz for each of the first five modules—no quiz in Module 6.

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.

Attempt the quiz at “Assessments” on the left-hand course menu.

Concepts Assignments

As we progress through the semester, you will complete concepts assignments that help you and your team solidify the concepts you have read in the textbook and online lectures. They must NOT be simply cut and paste from the class text or any other resources. Due to the required timing of the assignments, NO late assignment will be accepted for credit.

Submit at “Assignments” on the left-hand course menu.

Final Project

The Final Design will also be a Team deliverable whereby you will present your design criteria for a Content Delivery Network (CDN). The details of which will be described by your instructor as the class proceeds.

Proctored Final Exam

There will be a proctored Final Exam in this course.

Detailed instructions regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your own appointment.

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.

Boston University Metropolitan College